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vol. 24-25
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HELMINTHOLOGICAL ABSTRACTS //

VOL. 24

incorporating
BIBLIOGRAPHY OF HELMINTHOLOGY
For the Year 1955



COMMONWEALTH BUREAU OF HELMINTHOLOGY

The White House, 103 St. Peter's Street
St. Albans, England

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HELMINTHOLOGICAL ABSTRACTS //

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COMPILED FROM WORLD LITERATURE OF 1955



Prepared by the
COMMONWEALTH BUREAU OF AGRICULTURAL PARASITOLOGY
(HELMINTHOLOGY)

Published by the
COMMONWEALTH AGRICULTURAL BUREAUX, FARNHAM ROYAL, BUCKS., ENGLAND

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HELMINTHOLOGICAL ABSTRACTS

Vol. 24, Part 1

1955

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HELMINTHOLOGICAL ABSTRACTS

INCORPORATING BIBLIOGRAPHY OF HELMINTHOLOGY

FOR THE YEAR 1955

Vol. 24, Part I

1—American Journal of Hygiene.

- a. ZAIMAN, H. & SAFHOLM, R. D., 1955.—“Studies on the nature of immunity to *Trichinella spiralis* in parabiotic rats. VI. The origin and distribution of larval *Trichinella* in the muscles of parabiotic rats following a single infection of one twin.” 61 (1), 1-4.
- b. ZAIMAN, H., STONEY, J. M., RUBEL, J. & HEADLEY, N. C., 1955.—“Studies on the nature of immunity to *Trichinella spiralis* in parabiotic rats. VII. The immune response of the ‘uninfected’ twin one month after its mate received an immunizing dose of irradiated (X ray) larvae.” 61 (1), 5-14.
- c. ZAIMAN, H., STONEY, J. M. & HEADLEY, N. C., 1955.—“Studies on the nature of immunity to *Trichinella spiralis* in parabiotic rats. VIII. The duration of the immune response in the ‘uninfected’ parabiotic rat following infection of one twin with *Trichinella spiralis*.” 61 (1), 15-23.
- d. ROSEN, L., 1955.—“Observations on the epidemiology of human filariasis in French Oceania.” 61 (2), 219-248.

(1a) Previous work showed that when one member of a pair of parabiotic rats is infected with *Trichinella spiralis* its mate becomes more resistant to infection than do control pairs and that infection of one parabiotic rat resulted in muscle invasion of both twins. Details are now given of further experiments which indicate that the larvae in the muscle of the uninfected twin are probably derived from adult *Trichinella* in the intestines of the infected twin. R.T.L.

(1b) A single dose of *Trichinella spiralis* irradiated by X-ray was sufficient to make a parabiotic rat resistant to infection one month later with non-irradiated larvae. Its uninfected twin became more resistant than the rats in the control pairs. The resistance was stronger in the infected than in the uninfected twin. R.T.L.

(1c) Resistance to *Trichinella spiralis* in the uninfected twin of a pair of parabiotic rats persisted for as long as eleven months after immunization of its mate. When one twin was immunized with *T. spiralis* reproductively sterilized by X-rays, the pair were both resistant to infection for five months. R.T.L.

(1d) Rosen deals with the role of each of the local species of mosquitoes in the transmission of *Wuchereria bancrofti* in French Oceania. The quantitative characteristics of the sources of mosquito infection, the minimum density of microfilariae in the peripheral blood necessary to infect a significant proportion of the mosquitoes, the quantitative characteristics of infections produced in vector mosquitoes by various blood densities of microfilariae, and the effect of the filarial infection on the longevity of the mosquitoes are discussed, especially in relation to their significance in hetrazan treatment. The larvae of *Aedes polynesiensis*, which was the only representative of the *scutellaris* group found in the area, have distinctive morphological characteristics. The adults feed on man only in the daytime. Dissections of mosquitoes caught in the field showed that only *A. polynesiensis*, *A. aegypti* and *Culex quinquefasciatus* commonly harbour larval stages of *W. bancrofti* and only in *A. polynesiensis* were third-stage larvae commonly present. Few third-stage larvae resulted when more than 1,000 *C. quinquefasciatus* were fed on donors with different microfilarial densities of the Tahitian strain of *W. bancrofti* although this mosquito was an efficient host for the West Indian periodic strain. *A. polynesiensis* was a poorer vector of the West Indian periodic filaria than of the local non-periodic strains. A rhythmic but small fluctuation in the blood density during 24 hours was

observed in the Polynesian strain. Laboratory experiments indicated that *A. polynesiensis* and *C. quinquefasciatus* were adversely affected by large numbers of maturing larvae. Microfilariae in the blood of persons previously treated with hetrazan developed as readily in *A. polynesiensis* as did those from untreated individuals.

R.T.L.

2—American Journal of the Medical Sciences.

- a. CLEVE, E. A., LANGSJOEN, P. H. & HENSLER, N. M., 1955.—“The toxic effect of tartar emetic in treatment of schistosomiasis.” 229 (1), 74–80.

(2a) During treatment with tartar emetic of three cases of schistosomiasis, one due to *Schistosoma mansoni* and two due to *S. japonicum*, alarming but reversible symptoms of toxic myocarditis developed. It is therefore important that this drug should be administered with caution especially in undernourished or undersized individuals.

R.T.L.

3—American Journal of Tropical Medicine and Hygiene.

- a. BLAGG, W., SCHLOEGEL, E. L., MANSOUR, N. S. & KHALAF, G. I., 1955.—“A new concentration technic for the demonstration of protozoa and helminth eggs in feces.” 4 (1), 23–28.
- b. BURCH, T. A. & GREENVILLE, H. J., 1955.—“Filariasis in Liberia.” 4 (1), 47–51.
- c. GELFAND, H. M., 1955.—“Studies on the vectors of *Wuchereria bancrofti* in Liberia.” 4 (1), 52–60.
- d. WEINSTEIN, P. P., 1955.—“The effect of cortisone on the immune response of the white rat to *Nippostrongylus muris*.” 4 (1), 61–74.
- e. KUNTZ, R. E. & MALAKATIS, G. M., 1955.—“Susceptibility studies in schistosomiasis. II. Susceptibility of wild mammals to infection by *Schistosoma mansoni* in Egypt, with emphasis on rodents.” 4 (1), 75–89.
- f. NOLAN, M. O. & BOND, H. W., 1955.—“Results of laboratory screening tests of chemical compounds for molluscicidal activity. III. Derivatives of abietic acid.” 4 (1), 152–155.
- g. BROWN, H. W. & CHAN, K. F., 1955.—“Treatment of *Enterobius vermicularis* infections with piperazine.” 4 (2), 321–325.
- h. SWARTZWELDER, C., MILLER, J. H. & SAPPENFIELD, R. W., 1955.—“The treatment of cases of ascariasis with piperazine citrate. With observations on the effect of the drug on other helminthiases.” 4 (2), 326–331.
- i. BURCH, T. A., 1955.—“Treatment of wuchereriosis and onchocerciasis with suramin sodium.” 4 (2), 332–333.

(3a) The M.I.F. (merthiolate-iodine-formaldehyde) stain of Sapero & Lawless has been modified to increase its diagnostic yield for helminth eggs by the addition of ether to dissolve fats and to float faecal detritus. The M.I.F. preserved specimen is shaken vigorously for five seconds, strained through two layers of wet surgical gauze into a 15 ml. centrifuge tube to which 4 c.c. of refrigerated ether is added. The tube is closed with a rubber stopper and shaken vigorously. The stopper is then removed and the tube left standing for two minutes. It is then centrifuged for one minute at 1,600 r.p.m., resulting in the formation of four layers: ether on top, a plug of faecal detritus, an M.I.F. layer and a sediment containing helminth eggs on the bottom. The faecal plug is loosened by an applicator stick. All but the bottom sediment layer is quickly poured off. This sediment is mixed and a drop is poured on to a slide for examination. The procedure takes about four minutes and the recovery of eggs of *Schistosoma haematobium*, *S. mansoni* and *Ascaris lumbricoides* is almost doubled.

R.T.L.

(3b) In Liberia, the most satisfactory time for taking night blood for examination for microfilariae of *Wuchereria bancrofti* is between 9 p.m. and 11 p.m. 10.2% of night smears and 3.0% of day smears were positive. No *Loa loa* was observed. Only six out of 1,915 smears contained *Acanthocheilonema perstans* embryos. That *W. bancrofti* was much more common along the Liberian coast than in the interior is attributed to the presence of *Anopheles melas*, a brackish-water mosquito.

R.T.L.

(3c) Gelfand has tabulated the numbers of filaria larvae found in dissections of females of *Anopheles gambiae*, *A. melas* and *A. hancocki* caught wild in Marshall Territory, Liberia, and in *A. funestus* caught in a neighbouring territory, and the numbers found in these and other

species which were laboratory-reared and infected experimentally with *Wuchereria bancrofti*. In nature, *A. melas* was more heavily infected with the intermediate stages of *W. bancrofti* than was *A. gambiae*. In the laboratory, the percentage of *Culex fatigans* and *Aedes aegypti* which became infected experimentally was much lower and none were found naturally infected with advanced stages.

R.T.L.

(3d) If cortisone is administered to white rats while they are being immunized to *Nippostrongylus muris*, the inflammatory response in the skin to a challenging dose of larvae is suppressed. The larvae successfully penetrate this first barrier. During their subsequent migration some are trapped in inflammatory reactions in the lungs, liver and peritoneal membranes and this is the first report of the finding of migrating *N. muris* larvae in organs other than the skin and lungs. The majority however become adults of larger size than do those in untreated immune controls. If immunized rats are treated with cortisone a few days before the challenging dose of larvae, there is some reduction in the over-all immune reaction but the number of adults is not significantly different from that in the controls. A considerable precipitate forms at the excretory pore of the filariform larvae incubated in serum from all immunized groups.

R.T.L.

(3e) Thirteen species of small mammals common in Lower Egypt were exposed to counted numbers of *Schistosoma mansoni* cercariae and the adult parasites were recovered at autopsy six to fourteen weeks later. A table shows the number of each species used, the duration of infection, the percentages of adults found in liver, mesenteric veins, lungs and spleen, the percentage of animals with eggs in these organs and the percentage of animals showing splenomegaly. The number of adults, the egg production and the splenomegaly showed considerable variation in each host species. The Nile rat, *Arvicanthus niloticus* gave the best results. Although it lives along canals and in road banks near villages in rural areas, no naturally infected example has yet been found.

R.T.L.

(3f) Screening tests on *Australorbis glabratus* with abietic acid and 14 derivatives have been carried out. High molluscicidal activity at 10 p.p.m. was shown by dehydroabietylamine, dihydroabietylamine, tetrahydroabietylamine and by Rosin Amine D and its salts. Although the results were not so marked as those given by pentachlorophenol, the abietylamines are readily available at relatively low cost and are being used in large quantities as algicides in the U.S.A.

R.T.L.

(3g) Piperazine citrate syrup was used in the treatment of 120 patients with *Enterobius* infection diagnosed by Scotch tape swab. The dose rate varied according to body-weight from 2.5 c.c. twice daily (15-30 lb.) to 10 c.c. twice daily (61 lb. and over). Cure was effected by (i) a ten-day course in 89%, (ii) two seven-day courses one week apart in 92% and (iii) a 14-day course in 97%. Two out of 11 infected individuals lost their infection without treatment. The treatment did not eliminate the *Necator americanus* or *Trichuris trichiura* with which some of the patients were also infected.

R.T.L.

(3h) The efficacy of piperazine citrate syrup in eliminating light and heavy infections with *Ascaris lumbricoides* is confirmed. The egg count was reduced by 100% in 22 out of 25 cases and by 97% and 98% in two additional cases. The dose ranged from 25 mg. to 78 mg. per lb. body-weight divided into two or three equal doses daily. Treatment was given for from three to fifteen days; the maximum total dosage given was 555 mg. spread over eight days. Both mature and immature worms were evacuated alive but most were sluggish or flaccid. Rinsing of flaccid worms restored their motility. In two cases of *Hymenolepis nana* and three of *Strongyloides* the treatment was unsuccessful. In one hookworm patient there was an apparent reduction of 83% in the faecal egg count during treatment with 1.5 gm. of piperazine citrate daily for ten days.

R.T.L.

(3i) Surveys in Liberia by the Liberian Institute of the American Foundation for Tropical Medicine revealed that in the local population the incidence of onchocerciasis was

25.6% and that of wuchereriosis 16.4%. Twenty patients with onchocerciasis and 21 with wuchereriosis received intravenously an initial dose of 0.5 gm. and for six to nine weeks subsequently, weekly doses of 1 gm. of suramin sodium. Various aches and pains, chills and fever were very common. Eight to ten months later only two of the onchocerciasis cases gave positive skin biopsies while all the *Wuchereria* patients still had microfilariae one year after the course of treatment was completed.

R.T.L.

4—American Journal of Veterinary Research.

- a. SEIBOLD, H. R., BAILEY, W. S., HOERLEIN, B. F., JORDAN, E. M. & SCHWABE, C. W., 1955.—“Observations on the possible relation of malignant esophageal tumors and *Spirocerca lupi* lesions in the dog.” 16 (58), 5–14.
- b. SHARAF, A. & SHIHATA, I. M., 1955.—“*In vitro* studies on the anthelmintic effect of some antimalarial drugs.” 16 (58), 15–17.
- c. DRUDGE, J. H., WYANT, Z. N. & ELAM, G. W., 1955.—“Continuous phenothiazine therapy for horses. II. A taxonomic study following four years of treatment.” 16 (58), 18–21.
- d. KATES, K. C. & TURNER, J. H., 1955.—“Observations on the life cycle of *Nematodirus spathiger*, a nematode parasitic in the intestine of sheep and other ruminants.” 16 (58), 105–115.

(4a) Seven cases (plus three in an addendum) of malignant oesophageal tumours which appeared to be associated with *Spirocerca lupi* infection are reported in dogs. In seven of the ten cases there were lesions containing the parasite in the region of the tumours and in two the presence of deformative ossifying spondylitis gave presumptive evidence of *Spirocerca* infection.

D.M.

(4b) Sharaf & Shihata have studied the effect of atebrin, camoquin and paludrine on *Taenia pisiformis* and *Toxascaris leonina* in vitro, and on dog intestine. Atebrin stimulated *Taenia pisiformis*, inhibited dog intestine and had no effect on *Toxascaris leonina*; it may therefore be used with a purge as a taeniafuge. Camoquin stimulated *Taenia pisiformis* and dog intestine and, in large doses, inhibited *Toxascaris leonina*; it can be used as a vermifuge with or without a purge. Paludrine had no effect on either parasite.

D.M.

(4c) The authors give a taxonomic analysis of the parasites obtained from horses after four years of low level phenothiazine therapy. The species found were the same in treated and untreated animals. Of the nine species of small strongyles present only two had females with eggs in the uterus and males were generally absent, suggesting a relative resistance to the action of the drug. None of the large strongyles had eggs in the uterus but there was no change in the sex ratio. *Trichostrongylus axei*, *Oxyuris equi* and *Probstmayria vivipara* did not appear to be affected.

D.M.

(4d) Supplementing a previous paper [for abstract see Helm. Abs., 22, No. 8d] Kates & Turner have studied the tissue changes in the intestines of lambs given massive doses of *Nematodirus spathiger* larvae. The most severe damage was to the mucosa of the jejunum and was apparent as early as five days after infection, some larvae penetrating as deeply as the muscularis mucosae. The adults, which occur mainly in the lumen of the intestine and are less vigorous than the larvae, cause less damage. The prepatent period in *N. spathiger* in lambs is about two weeks, whereas that of *N. helvetianus* in calves is three weeks. Of especial interest is the observation in the larvae of a well developed excretory system, particularly the renette cells, and the authors are of the opinion that although this has not been recorded in other species of *Nematodirus* it is probably present.

D.M.

5—American Midland Naturalist.

- a. DORAN, D. J., 1955.—“A catalogue of the protozoa and helminths of North American rodents. III. Nematoda.” 53 (1), 162–175.
- b. FISCHTHAL, J. H., 1955.—“Ecology of worm parasites in south-central New York salamanders.” 53 (1), 176–183.
- c. BANGHAM, R. V., 1955.—“Studies on fish parasites of Lake Huron and Manitoulin Island.” 53 (1), 184–194.

- d. NAJARIAN, H. H., 1955.—"Trematodes parasitic in the Salientia in the vicinity of Ann Arbor, Michigan." 53 (1), 195-197.
- e. HOFFMAN, G. L., 1955.—"*Neascus nolfi* n.sp. (Trematoda: Strigeida) from cyprinid minnows with notes on the artificial digest recovery of helminths." 53 (1), 198-204.
- f. COLE, G. A., 1955.—"An ecological study of the microbenthic fauna of two Minnesota lakes." 53 (1), 213-230.

(5a) This is the third of four papers summarizing the host and geographical distribution records of protozoa and helminths from North American rodents. The nematode species are listed alphabetically under genera and cross-referenced to an alphabetical list of authors and their publications.

M.MCK.

(5b) The 22 helminth species, of which ten were trematodes, three cestodes and nine nematodes, recovered from 220 out of 503 salamanders belonging to seven species in southern central New York State are annotated. It was found that the older and more permanent the habitat, the more helminth species were present and the greater were the incidence and intensity of infections. The latter tends to build up in smaller lakes and ponds and increases seasonally from mid-summer to autumn. In aquatic hosts incidence and number of species of parasites were higher than in terrestrial hosts and more multiple infections occurred. All the helminths reported in this study represent new distribution records and four of them present six new host records.

M.MCK.

(5c) The helminths found in 1,642 out of the 1,667 fish examined from Lake Huron are listed under the 52 host species in order of frequency of their occurrence and with a brief discussion on the degree of infection and distribution of each species. The most common were *Diplostomulum* sp. in 939 fish belonging to 44 species and *Posthodiplostomum minimum* cysts in 411 hosts of 22 different species.

M.MCK.

(5d) Najarian records 11 species of trematodes and four species of metacercariae from 102 amphibian hosts belonging to nine species of Salientia from the vicinity of Ann Arbor, Michigan. With three exceptions all are new distribution records. *Brachycoelium salamandrae* in *Acris gryllus* and *Rana sylvatica*, and *Cephalogonimus vesicaudus* in *R. clamitans* are new host records.

M.MCK.

(5e) *Neascus nolfi* n.sp., a strigeid cercaria in *Semotilus a. atromaculatus* and *Notropis cornutus frontalis* from North Dakota, forms a spherical cyst measuring 202 μ to 324 μ in diameter surrounded by a pigmented host cyst. The metacercaria is 290 μ to 382 μ long, lacks a reserve bladder in the excretory system, possesses a ventral sucker and is intolerant of pepsin solution. This combination of characters distinguishes it from *Uvulifer* (*Neascus*) *ambloplitis*, *Crassiphiala* (*Neascus*) *bulboglossa*, *N. pyriformis*, *N. ellipticus* and *N. rhinichthysi*. To compare methods of collecting helminths from fish tissue, Hoffman prepared a digest solution of 0.5% pepsin in 0.25% hydrochloric acid made up in 0.65% 3-salt Ringer's solution. When applied until all the tissue was dissolved it yielded active nematode larvae and a few *Posthodiplostomum minimum* but no *Neascus nolfi*, gasterostome metacercariae or cestode larvae although these were present. *Uvulifer ambloplitis* were active after this treatment but did not survive transplantation to fish of the same species. However, the few *N. nolfi* and *U. ambloplitis* retrieved after an eight-minute Waring blender maceration followed only by saline washing were alive five weeks after similar transplantation. Digestion of macerated tissue for 10-15 minutes yielded dead *N. nolfi* intact in the cyst and live *U. ambloplitis*. A 10-15 minute pepsin digest of gut mucus and mucosa worked better than the 0.7% sodium bicarbonate method of Bangham (1951) in freeing helminths. A key is given for the identification of the known larval strigeids of North American fish.

M.MCK.

(5f) Examination of the microbenthic fauna in Lake Itasca and Crystal Lake, Minnesota, yielded three nematodes, viz., *Dorylaimus* sp., *Trilobus* sp. and an unidentified nematode. The *Trilobus* sp. was one of the three species of microscopical animals which were typical of the profundal zone, but it was not wholly confined to that region.

M.MCK.

6—Annales de Parasitologie Humaine et Comparée.

- a. RANQUE, J. & NICOLI, R. N., 1955.—“Considérations parasitologiques sur la cénurose cérébrale, à propos d'un nouveau cas.” 30 (1/2), 22-42.
- b. TIMON-DAVID, J., 1955.—“Cycle évolutif d'un trématode cyclocoelidé: *Pseudhyptiasmus dollfusi* Timon-David 1950. Recherches expérimentales.” 30 (1/2), 43-61. [English summary p. 60.]
- c. GAUD, J. & DUPUY, R., 1955.—“Rythmes de développement de *Bulinus truncatus* en élevage au laboratoire.” 30 (1/2), 62-68.
- d. SCHUURMANS STEKHOVEN, J. H. & MAWSON, P. M., 1955.—“Mermithidés d'Alsace.” 30 (1/2), 69-82.
- e. CHABAUD, A. G., 1955.—“Essai d'interprétation phylétique des cycles évolutifs chez les nématodes parasites de vertébrés. Conclusions taxonomiques.” 30 (1/2), 83-126.
- f. VERCAMMEN-GRANDJEAN, P. H., 1955.—“Séchage rapide des préparations microscopiques montées à l'alcool polyvinyle. Utilisation de cette résine en milieu aqueux pour l'étude des trématodes.” 30 (1/2), 155.

(6a) Ranque & Nicoli have identified as *Coenurus multiceps* material obtained from the brain in a fatal case of cerebral coenuriasis. At a preliminary biopsy a bladder with three scolices was recovered in the region of the chiasma but at post-mortem only sterile bladders were found there. Normal coenuri in other parts of the brain measured from 5 mm. to 15 mm. in diameter and contained four or five scolices. The paper is illustrated with a number of photographs of coenuri *in situ* and of the scolices and their hooks, and *C. multiceps* and *C. serialis* are compared. S.W.

(6b) Timon-David has completed the life-cycle of *Pseudhyptiasmus dollfusi* experimentally. *Helicella (Helicopsis) arenosa* were infected by feeding them eggs of *P. dollfusi* on moist filter paper. Eggs could be induced to hatch by placing them in spring water and actively swimming miracidia, each containing a well developed redia, emerged. Formation of cercariae was apparent in 50-day-old rediae and development was complete in rediae 90 days old. The cercariae did not emerge from the rediae but encysted within them. Pigeons were infected by feeding them snails containing mature rediae. The complete cycle from egg to adult took 140 days. The morphology of each stage is described and illustrated. S.W.

(6c) Gaud & Dupuy have studied the seasonal variations in oviposition and rate of development in laboratory-reared *Bulinus truncatus*. Four times as many eggs were laid per snail in August as in January. Snails hatched in August took 200 days to mature whereas those hatched in May commenced to lay eggs in 50 days. They consider that these factors should be taken into consideration in deciding on the optimum time of year for applying molluscicides. S.W.

(6d) Schuurmans Stekhoven & Mawson have studied the mermithids collected by Couturier. They point out that *Tunicamermis melolonthinarum* proposed by Couturier in 1951 [for abstract see Helm. Abs., 20, No. 89a] is a nomen nudum; they give a diagnosis of the genus and a description of this species which they name *Tunicamermis melolonthae* Schuurmans Stekhoven, Mawson & Couturier. Detailed descriptions and illustrations are given of: *Pseudomermis hagmeieri* n.sp., of which larvae were found in *Amphimallon* and *Melolontha melolontha* larvae, and adults in the latter and free in the soil; *Agamermis couturierii* n.sp., of which two adult females were found in the soil; and *A. cobbi* n.sp., of which larvae occurred in *M. melolontha* larvae, and females in the soil. S.W.

(6e) From a study of a number of life-cycles of nematodes parasitic in vertebrates, Chabaud formulates the following general rules: (i) that there are always one adult and four larval stages (except in *Spirura rytipleurites seurati*); (ii) that in the phasmid nematodes the third-stage larva is infective but if it penetrates the definitive host earlier than this, the definitive host acts as an intermediate host until after the second moult; (iii) that during evolution the pre-infective stages have acquired a progressively more marked degree of seclusion; (iv) that certain life-cycles tend to become simplified. The migrations of third-stage strongylid larvae after penetrating the skin and that of second-stage ascarids appear to be ancestral relics where the cycle has become modified and the migrations unnecessary. On the other hand, the

migration of the adults in the spirurids has appeared in specialized types. He concludes that there is a fundamental biological difference between the phasmid and aphasmid nematodes and divides the former into seven and the latter into three groups, contrary to the classic conception. The Rhabditoidea with a heterogonic cycle illustrate the most primitive type, the homogonic type of cycle being secondary. The cycles in the strongylids which include infection by skin penetration are primitive and migration, in these cases necessary, becomes pointless when infection by mouth becomes established. The Cosmocercidae, on biological as well as on morphological grounds, appear to be very primitive Ascaridina. In the oxyurids the cycle is very specialized and Chabaud is of the opinion that the cycle of *Probstmayria* is derived from the normal oxyurid cycle and does not correspond to one of the first stages in the evolution of parasitism. The Oxyuroidea should be separated from the Ascaridioidea because in the former there is complete maturation of the first two larval stages within the egg. In all the Meta-strongyloidea the third-stage larva is infective. He agrees with Sprent that the cycles of primitive ascarids are heteroxenous and that in the more specialized ascarids the same host acts as intermediate and definitive hosts. This explains the pulmonary migration in *Ascaris lumbricoides* and the fact that the larva is infective at the beginning of the second stage. In ascarids which are obligatorily heteroxenous the same animal may act as intermediate host if it ingests the egg and definitive host if it ingests the larva. The cycles of the Heterakidae and the Ascaridinae are derived from the cycles of monoxenous ascarids. On purely hypothetical grounds, the cycle of *Porrocaecum crassum* is derived from that of other anisakids, the vertebrate intermediary being replaced by an invertebrate. The cycles of the Gnathostomatidae show a number of primitive features and Chabaud proposes that these should be attached to the Physalopteroidea. In the spirurids, the heteroxeny is different in origin from that in the ascarids and the cycles are complicated by the migrations of the adults in the tissues of the definitive host. In the aphasmid nematodes one can postulate the existence of a primitive cycle in which all four moults take place in the definitive host. A comparison between the biological arrangement proposed by Chabaud and the morphological classification proposed by Chitwood shows them to be in very close agreement. S.W.

(6f) Vercammen-Grandjean has found an aqueous solution of polyvinyl alcohol (prepared with the help of Rhodoviol HS 10) very useful for studying cercariae as their movements are slowed down and they live in the medium for several hours. S.W.

7—Annals of Applied Biology.

- a. ELLENBY, C., 1955.—“The seasonal response of the potato-root eelworm *Heterodera rostochiensis* Wollenweber: emergence of larvae throughout the year from cysts exposed to different temperature cycles.” 43 (1), 1–11.
- b. ELLENBY, C., 1955.—“The permeability to the hatching factor of the cyst wall of the potato-root eelworm, *Heterodera rostochiensis* Wollenweber.” 43 (1), 12–18.
- c. WINSLOW, R. D., 1955.—“The hatching responses of some root eelworms of the genus *Heterodera*.” 43 (1), 19–36.

(7a) Hatching tests were carried out on cysts of the potato root eelworm stored under air-dry conditions (i) at room temperature (which fluctuated considerably), (ii) at 23°C., (iii) at about 5°C., (iv) for six months at 23°C. followed by six months at 5°C. and (v) for six months at 5°C. followed by six months at 23°C. The hatching tests started about one year after the beginning of storage and continued at one or two-month intervals for three years. There was no evidence of any period of dormancy nor of any seasonal variation in hatching rate. The greatest numbers of larvae hatched from cysts stored at room temperatures. M.T.F.

(7b) An experiment is described in which a small particle of a chemical which can stimulate the hatching of potato root eelworm larvae is sealed inside part of an eelworm cyst wall. The whole is immersed in water in which is deposited half of an eelworm cyst containing embryonated eggs. It is shown that the stimulating substance can cause hatching of the larvae although enclosed in the cyst wall. The cyst wall is also shown to be permeable to dissolved air. M.T.F.

(7c) Winslow has made very extensive laboratory hatching tests with cysts of *Heterodera schachtii*, *H. schachtii* var. *trifolii*, *H. schachtii* var. *galeopsidis*, *H. cruciferae*, *H. carotae*, *H. humuli*, *H. major*, *H. göttingiana* and *H. rostochiensis*. In all species and varieties except *H. göttingiana* and *H. major* there were marked differences in hatching responses towards root leachings from different plants. These differences were virtually diagnostic for the eelworm species, which usually hatched in the presence of leachings from host plants but failed to respond in the non-host leachings, although some cases were encountered of failure to respond to host leachings and some of stimulation by non-host leachings. Mixtures of certain eelworm species could be analysed by means of hatching tests. Cysts of *H. göttingiana* and *H. major* failed to respond in the laboratory to their respective host leachings but there was evidence that the former responds to pea root leachings in the field. Rate-of-hatching curves for seven species resembled those described by Fenwick for potato root eelworm as did hatching in diluted root leachings in the case of five of the species. Experiments to test the effect on the potency of root leachings of the age of the host plant and of the storage of the leachings were also carried out for a number of different host plants; the results are presented graphically. M.T.F.

8—Annals of Tropical Medicine and Parasitology.

- a. DAVIES, A. M. & ELIAKIM, M., 1955.—“Bilharzia in Israel: an immunological survey amongst recent immigrants.” 49 (1), 9–23.
- b. JORDAN, P., 1955.—“Microfilarial density and infection rates of *Wuchereria bancrofti* and *Acanthocheilonema perstans* in the Southern Province of Tanganyika Territory.” 49 (1), 42–53.
- c. KERSHAW, W. E., PLACKETT, R. L. & BEESLEY, W. N., 1955.—“Studies on the epidemiology of filariasis in West Africa, with special reference to the British Cameroons and the Niger delta. VI. The chance of infection with *Loa loa* incurred by *Chrysops* in feeding on different age-groups of the human population in villages in the rain-forest and in the forest fringe of the British Cameroons.” 49 (1), 66–79.
- d. GORDON, R. M. & WEBBER, W. A. F., 1955.—“A new technique for the concentration of microfilariae from the venous blood, and its application to their detection in persons harbouring them in low density; together with observations on the significance of such low densities.” 49 (1), 80–95.
- e. KERSHAW, W. E., BEESLEY, W. N. & CREWE, W., 1955.—“Studies on the intake of microfilariae by their insect vectors, their survival, and their effect on the survival of their vectors. VI. Further observations on the intake of the microfilariae of *Loa loa* and *Acanthocheilonema perstans* by *Chrysops silacea* in laboratory conditions: the pattern of the intake of a group of flies.” 49 (1), 114–120.

(8a) Of 690 immigrants into Israel from the Yemen and Aden examined for schistosomiasis by the skin test, 214 gave positive and 20 doubtful positive reactions; the incidence in this group increased with age from 21% at 3–4 years to 85% over 50 years of age. Of 414 persons from Iraq 8.2% gave positive or doubtful reactions and the incidence decreased with age from 16.7% in the 3–4 years old group to nil over 50. Of 235 Persian immigrants only 6.8% gave positive reactions and none of these were in persons over 40 years of age. Of 48 immigrants from Afghanistan three gave positive skin tests. Sera of 356 persons from Morocco were tested for complement fixation and only one positive was found. The authors point out that although only one out of 86 native-born Israelis was found to be positive there is a great potential danger of the disease spreading since many of the infected persons live close to water in which relevant snail vectors occur. S.W.

(8b) Jordan compares the microfilarial density (the mean count of all positive bloods found in a particular group of people) and the microfilaraemia rate of a village (the percentage of males over 16 years old with microfilariae in one specimen of night blood but without elephantiasis or hydrocele) and finds them to be related. The incidence of both *Wuchereria bancrofti* and *Acanthocheilonema perstans* increases with age but only in the latter is this accompanied by a consistent increase in microfilarial density. Mixed infections are common. In cases with hydrocele the microfilarial density is slightly higher than in those without although the incidence of microfilaraemia is the same. The hydrocele rate appears to be related to the microfilaraemia rate and to increase with age. S.W.

(8c) From observations made in two small and two large villages in the rain-forest, Kershaw *et al.* have shown that middle-aged adults are the most effective reservoirs of *Loa loa* and that the chance of a *Chrysops* becoming infected is greater in a small village, irrespective of whether it is feeding at random on any age group or on the optimum effective reservoir. In the villages across the abrupt forest fringe the middle-aged and elderly are the most effective reservoirs although the probability of flies becoming infected becomes progressively less during the transition from rain-forest to grassland. The greatest contribution from man to infection in the fly is from infections of which the present incidence and intensity are the results of 30-40 years of continuous exposure. S.W.

(8d) Gordon & Webber describe an apparatus for concentrating microfilariae from venous blood. The blood is haemolysed, the microfilariae fixed by adding formalin and the solution diluted to a concentration of one part whole blood in 200 parts dilute formalin. This is then passed through a filter cone made of stainless steel mesh (aperture 23μ) at a rate of approximately 10 ml. per second. The whole apparatus and technique are described in detail and the need for very careful cleansing of the apparatus with filtered distilled water is stressed. In an examination of persons infected with *Loa loa*, *Acanthocheilonema perstans* or both, the thick film method gave 28% positives and the new technique 46%. S.W.

(8e) Kershaw *et al.* have re-examined data presented in a previous paper [for abstract see Helm. Abs., 23, No. 8c] on the intake of microfilariae of *Loa loa* and *Acanthocheilonema perstans* by *Chrysops*. They now analyse it for groups of flies instead of individuals and show that for a group the actual and the expected intake, the population exposed and, in the conditions of the experiment, the population at risk (which is defined as "the synthetic population of human volunteers, each corresponding to one occasion on which a group of flies was fed on the same volunteer"), are related and that the relations are capable of mathematical analysis. In *L. loa* the curve for the actual intake has a wider variation and a smaller mean than that for the population exposed, whereas in *A. perstans* they are all directly related with little modification. S.W.

9—Australian Journal of Agricultural Research.

- a. DURIE, P. H., 1955.—"A technique for the collection of large numbers of paramphistome (Trematoda) metacercariae." 6 (1), 200-202.

(9a) A 400 c.c. glass beaker is coated inside with yellow grease pencil and outside with a clear plastic solution which is allowed to harden; a 60 watt electric light bulb is placed in the beaker which is suspended in an aquarium containing snails infected with paramphistomes (*Ceylonocotyle streptocoelium* and *Paramphistomum ichikawai*). Cercariae of both species are attracted to the yellow light, provided there is no other source of strong light, and encyst on the plastic film. This is easily removable. The yellow light had no attraction for *Fasciola hepatica* cercariae. S.W.

10—Australian Journal of Zoology.

- a. MACKERRAS, M. J. & SANDARS, D. F., 1955.—"The life history of the rat lung-worm, *Angiostrongylus cantonensis* (Chen) (Nematoda: Metastrongylidae)." 3 (1), 1-21.

(10a) Mackerras & Sandars describe the life-cycle of *Angiostrongylus cantonensis* obtained from the pulmonary arteries of *Rattus norvegicus*, *R. rattus*, *R. culmorum* and *R. assimilis* in Australia. In experimentally infected laboratory rats the unsegmented ova are discharged into the blood stream and lodge as emboli in the smaller vessels; the first-stage larvae break through into the respiratory tract, migrate up the trachea and pass out in the faeces. *Agriolimax laevis*, and to a lesser extent, *Limax arborum* and *Onchidium* sp. proved efficient intermediate hosts. The larvae actively penetrate the slugs and perhaps are also ingested, for *A. laevis* was observed to eat rat faeces. The larvae moult twice but do not exsheath and on being eaten by the rat exsheath in the stomach. On leaving the ileum the larvae become blood-borne

and congregate in the central nervous system, especially in the anterior cerebrum, where the third and fourth moults occur. Young adults emerge on the surface of the brain on the 12th to 14th day, spend two weeks in the subarachnoid space and then migrate via the venous system through the heart to the lungs. Here they continue growing and mature by the 42nd to 45th day in the rat. Cerebral derangement was observed only in heavily infected animals. Infections in white mice proved highly detrimental to both host and parasite but guinea-pigs survived well although the worms did not attain maturity. The adult and larval stages are described and the effect of the worms on the hosts are treated in detail. This is the first metastrongyle known to develop regularly in the brain of the definitive host. M.MCK.

11—Australian Veterinary Journal.

- a. GORDON, H. McL., 1955.—"Fascioliasis, with particular reference to acute fluke disease." 31 (2), 46-47. [Discussion pp. 49-50.]
- b. KEOGH, J., 1955.—"Fascioliasis in South Australia." 31 (2), 48-49. [Discussion pp. 49-50.]
- c. GORDON, H. McL., 1955.—"Anthelmintic effects of piperazine on helminths of sheep." [Correspondence.] 31 (2), 52.

(11a) In Australia there are about 20 million sheep in those districts where *Fasciola hepatica* is found, the presence of the parasite depending on the geographical distribution of the intermediate host *Simulimnaea subaquatalis*. *F. hepatica* is directly or indirectly responsible for three diseases, i.e. acute and chronic fascioliasis and black disease. Outbreaks of chronic fascioliasis are rare due to the use of carbon tetrachloride, but subclinical chronic cases have considerable economic importance. Acute fascioliasis results from a tactical misapplication of the striving for fulfilment of the parasite's biotic potential. It has not been produced experimentally so knowledge of its epidemiology is lacking. It occurs with, and obscures the diagnosis of, black disease and discredits vaccination against that disease. Its onset is sudden but large doses of carbon tetrachloride enable quick control of outbreaks. Vaccination against black disease should give lifelong protection, but irregular vaccination and confusion with acute fascioliasis have resulted in its still being of economic importance. The high biotic potential of *F. hepatica* and methods of attack against it are discussed. The basic attacks should be against the intermediate host. New molluscicides have promise, but pretreatment by drainage and work on methods of application of the molluscicides are essential. D.M.

(11b) South Australia may be divided into three regions when discussing fascioliasis. The south-east and southern Adelaide hill regions lie in the high rainfall areas of the State and large areas are poorly drained and subject to flooding in winter. Liver-fluke has been a source of loss there since 1874. Recent extensive drainage in the south-east has restricted the habitats of the vector *Simulimnaea subaquatalis* to a few creeks, swamps and drains but liver-fluke, spotlighted by black disease losses, occurs when there is a succession of wet years. The position in the south of Adelaide is similar. The vector has been located in springs and swamps over a fairly wide area and black disease is still seen occasionally. In the lower Eyre Peninsula there is a large population of *S. subaquatalis* but it is confined to springs and one large swamp and liver-fluke is absent. In the Murray River and lake system sea water formerly entered and salinified the stream for up to 30 miles during the summer months but in 1939 the sea was excluded by a system of barrages. This has led to the development of a fresh-water fauna including *S. subaquatalis*, and acute fascioliasis in sheep is now a major problem. The large area involved and the rapid change in the level of the water has rendered molluscan control impracticable. Sheep-rearing has been replaced by cattle grazing in large areas but the spread of cattle paramphistomes is now feared. R.T.L.

(11c) Recent investigations have shown that piperazine is a useful anthelmintic against some nematode parasites of domestic animals. The following results were obtained in preliminary trials with piperazine or its derivatives on certain nematodes in sheep. Doses of 4 gm. of piperazine hydrate, piperazine diacetate or Safersan (piperazine-1-carbodithioic betaine) were injected into the rumens of 12 sheep. The drugs proved 100% efficient against

Oesophagostomum columbianum and *O. venulosum*, but not against *Haemonchus contortus* and *Trichostrongylus* spp. 4 gm. of piperazine hydrate were injected into the rumens of four sheep but it was not effective against *Chabertia ovina*. Doses of up to 25 gm. of piperazine hydrate injected into the rumen, or up to 10 gm. into the abomasum, were ineffective against *Trichostrongylus* spp. 4 gm. of piperazine hydrate injected into the abomasum was ineffective against *H. contortus*. 4 gm. of Safersan injected into the abomasum was ineffective against *Trichostrongylus* spp. A mixture of copper sulphate, nicotine sulphate and piperazine hydrate proved very effective in a small field trial against *H. contortus* and *O. columbianum*. An emulsion, administered orally, containing carbon tetrachloride and piperazine hydrate was highly effective against *H. contortus* and *O. columbianum*. The apparent differential effect on *O. columbianum* and *C. ovina* may be due to their different feeding habits, for both inhabit the same region of the colon and are closely related. Piperazine appears similar to 1:8 dihydroxy-anthraquinone in that it has little effect on *H. contortus* but is highly efficient against *O. columbianum*.
D.M.

12—Beet Grower. Dublin.

- a. ANON., 1955.—“Beet eelworm.” [Editorial.] 8 (4), 167-168.
- b. GAHAN, W., 1955.—“Root eelworm of sugar beet.” 8 (4), 185-189.

(12a) *Heterodera schachtii* has been detected in a number of sugar-beet crops in the counties of Carlow, Cork, Waterford and Wexford of the Republic of Ireland but the infection is not yet serious or widespread. The Council of the Beet Growers' Association have agreed to an amended clause in the Sugar Beet Contract for 1955/1956 by which growers are required not to cultivate this crop on ground in which sugar-beet or other susceptible crops were grown in 1954 or 1953, or on ground in the same field within 20 yards of that on which any one of these crops was grown in 1954 or 1953.
R.T.L.

(12b) In view of the recent recognition of eelworm infestation on a number of beet crops in Ireland, Gahan outlines the life-history and mode of spread of *Heterodera schachtii*. Summarizing preventive and control measures, he advocates putting infested land down to grass for five or six years and the adoption of a four-year rotation for all crops of the beet family including red beet, mangolds and spinach and of the cabbage family. Grain crops and potatoes are not susceptible. Attention is drawn to the fact that many of the common weeds including docks, sorrel, lamb's quarters, redshank, charlock and chickweed can harbour this eelworm.
R.T.L.

13—Berliner und Münchener Tierärztliche Wochenschrift.

- a. HAGEN, K., 1955.—“Zur Bekämpfung von *Cysticercus inermis*.” 68 (2), 27.
- b. LIEBMANN, H., 1955.—“Zooparasiten im Abwasser.” 68 (6), 97-98.
- c. MENDHEIM, H., 1955.—“Bemerkungen zur Biologie des Katzenbandwurms.” 68 (7), 117.

(13a) Hagen considers that control of *Cysticercus bovis* will only be achieved if the following measures are strictly observed: (i) education of the public on the relation between *C. bovis* and *Taenia* infection in man; (ii) prohibition of the sale of anthelmintics to individuals; and (iii) treatment of all cases of *Taenia saginata* infection in hospital to ensure proper supervision of drug administration and adequate destruction of eliminated tapeworms.
A.E.F.

(13b) Liebmann reviews earlier studies on the importance of sewage in the spread of helminth infections and points out that most of the work has been concerned with helminths of importance to man, to the neglect of those occurring in domestic animals. He concludes that ascarid ova in sewage are likely to be destroyed after three months in digestion tanks but that in septic tanks and cesspools ten to twelve months are necessary to kill ova. Liebmann commends a regulation in force in Bavaria which prohibits the use of sewage on agricultural land until it has been purified, digested and dried for prescribed minimum periods.
A.E.F.

(13c) Mendheim briefly refers to the various definitive hosts recorded for *Cysticercus fasciolaris* and draws attention to the desirability of determining the identity of *Taenia infantis* [found once in a child by Bacigalupo in 1922] with the *Taenia* of the cat [*T. taeniaeformis*].

G.I.P.

14—British Farmer.

- a. JONES, F. G. W. & RIETBERG, H., 1955.—“Beating the eelworm.” 8 (1), 12–13.

(14a) In an address to the National Farmers' Union Sugar-Beet Committee, Rietberg of the Dutch Instituut voor Rationele Suiker Productie stated that in the Netherlands the beet eelworm is now widespread throughout the south-western beet areas while the northern and north-eastern areas are practically free. The increase is attributed to insufficient crop rotation in the early stages of beet growing, lack of knowledge of the range of hosts and carelessness in transporting soil from one field to another. The most dangerous increase took place during and shortly after the first world war. Since 1940 a system of crop rotation has been based on the cyst counts of soil samples. Most of the samples are taken between September and February. The results (after empty cysts and cysts of other species have been eliminated), the soil type and type of farming practised, together with information obtained from statistical data based on field trials on a series of 100 fields sampled annually for this purpose, are used by the specialists who send separate advice on a standard form to each farmer. Although the scheme is voluntary the recommendations are followed by 98% of the farmers. One of the most difficult problems in this advisory work is to convince the farmer of the danger from the inclusion in their rotations of cruciferous crops which can build up an eelworm population without showing symptoms of the infection. As a prelude to Rietberg's article the present position in England is briefly outlined by Jones.

R.T.L.

15—British Medical Journal.

- a. KING, B. A., 1955.—“Treatment of schistosomiasis with ‘nilodin’.” Year 1955, 1 (4907), 185–188.
 b. MCFADZEAN, J. A., 1955.—“Tropical pulmonary eosinophilia in a West African.” Year 1955, 1 (4916), 771–772.
 c. BICKERSTAFF, E. R., 1955.—“Cerebral cysticercosis. Common but unfamiliar manifestations.” Year 1955, 1 (4921), 1055–1058.
 d. ADAMS, A. R. D., SEATON, D. R. & KERSHAW, W. E., 1955.—“Tropical pulmonary eosinophilia in a West African.” [Correspondence.] Year 1955, 1 (4921), 1094.
 e. WARD, J. M., 1955.—“Accidental poisoning with tetrachlorethane.” Year 1955, 1 (4922), 1136.

(15a) King used nilodin to treat miners with schistosomiasis in the Witwatersrand and Orange Free State, where reinfection with the disease could not occur. Diagnosis was based on laboratory examination of specimens of urine and faeces for the presence of viable ova. The nilodin was administered as tablets each containing 200 mg. Two series of cases of urinary schistosomiasis were treated; in the first series (24 cases) an average daily dose of 22 mg. per kg. body-weight was given for twelve days and in the second (22 cases) a daily dose of 25 mg. per kg. was given for nine days. The clinical response was good but did not come up to expectation. In most cases of frank haematuria, the bleeding stopped on the eighth day and a six-month cure of 60% and 33% respectively in the two series was achieved. Relapses occurred six months after treatment. Toxic symptoms occurred in 56.7% of the cases and although most of these were controlled in some cases the amount of nilodin had to be reduced. A dose of 20 mg. per kg. per day was given to subjects with *Schistosoma mansoni* infection, for 12 days in three cases and for six days in one case. The clinical response was excellent and no clinical relapses occurred during the follow-up period, though in two cases there was a technical relapse as shown by the recovery of viable ova from the rectum. A case of mixed *S. mansoni* and *S. haematobium* infection of the bladder was particularly interesting because during the follow-up period, macerated eggs of *S. mansoni* were recovered from the urine at 7 out of 15 examinations and on one occasion a macerated egg of *S. mansoni* was recovered from the rectal mucosa. King concludes that there is little variation in the

susceptibility of *S. haematobium* and *S. mansoni* to nilodin when given in adequate dosage over a long enough period and that the drug is highly effective in the treatment of schistosome infections in the non-European mine labourers in South Africa.
D.L.H.R.

(15b) McFadzean gives the clinical history and laboratory findings of a Nigerian case of tropical pulmonary eosinophilia and states that this condition has apparently not been reported previously in West Africans. There were swellings on the right cheek, right calf and right forearm which were probably Calabar swellings. The patient complained of a dry cough, shortness of breath on exertion and a burning sensation all over the inside of the chest. No microfilariae were seen in the peripheral blood but there was an eosinophilia of 88% which the possible presence of *Loa loa* infection did not explain. No X-ray of the chest was made nor was the sputum examined. There was no evidence of infection with other helminths.
R.T.L.

(15c) Periods of disordered behaviour, transient paresis, intermittent obstructive hydrocephalus, disequilibrium, meningo-encephalitis, involuntary movements, failing vision and mental disturbances were seen in seven cases of cerebral cysticerciasis observed in Britain. Of these, three were probably acquired in India, two in Poland and one in the Ukraine. Several of these different clinical symptoms were present in the same patient.
R.T.L.

(15d) It is pointed out that it is not unusual for persons with Calabar swellings due to loaiais to show an eosinophilia of the order of that reported by MacFadzean [see No. 15b above] whose patient seemed to present the ordinary features of this common West African disease.
R.T.L.

(15e) Tetrachlorethylene is often given instead of carbon tetrachloride in cases of hookworm in children and undernourished adults. In three cases tetrachlorethane was administered instead of tetrachlorethylene. Two of the cases were adults. Both became deeply unconscious but recovered after gastric lavage and the intravenous injection of nikethamide. The third case was a child but a strong emetic prevented any untoward effects. The error occurred through the similarity of the names tetrachlorethane and tetrachlorethylene.
R.T.L.

16—California Agriculture.

- a. RASKI, D. J., 1955.—“Control of nematodes on grapes. Soil fumigation with crop rotation tested as way to protect grape replants against root parasites.” 9 (1), 9–10, 15.

(16a) The root-knot nematode, *Meloidogyne incognita* var. *acrita*, causes widespread damage to grapevines in California; *Pratylenchus vulnus* is equally serious but less widespread. Plots in five different vineyards were fumigated with D-D mixture and ethylene dibromide at various dosages after the removal of diseased vines. Observations were made on growth and nematode injury of vines planted subsequently. In four of the plots nematode control was unsatisfactory, probably because fumigation was carried out within three months of the removal of the infested vines, when many old galled roots would be present in the soil. The most promising results were in a plot which had grown beans for three years since the removal of the vines. There was a very high population of root-knot nematodes but control was very effective.
M.T.F.

17—Canadian Journal of Biochemistry and Physiology.

- a. FAIRBAIRN, D., 1955.—“Lipids of the female reproductive organs in *Ascaris lumbricoides*.” 33 (1), 31–37.
- b. FAIRBAIRN, D., 1955.—“Embryonic and postembryonic changes in the lipids of *Ascaris lumbricoides* eggs.” 33 (2), 122–129.
- c. FAIRBAIRN, D. & PASSEY, B. I., 1955.—“The lipid components in the vitelline membrane of *Ascaris lumbricoides* eggs.” 33 (2), 130–134.

(17a) Fairbairn has studied the distribution of lipids in female *Ascaris* and has found that 20% of the lipids occurred in the muscles, which represent 70% of the total dry weight

of the worm, whereas 66% of the lipids occurred in the reproductive organs which only comprise 24% of the total dry weight. Lipids obtained from pooled female organs were fractionated and the relative concentrations were, volatile acids (acetic, propionic, butyric, pentanoic and hexanoic) 12.9, non-volatile acids 51.9, unsaponifiables 21.4 and phospholipids 8.3. The presence of at least two 3, β -hydroxysterols was demonstrated and this is the first record of these sterols in nematodes. S.W.

(17b) Using de-coated eggs obtained from the lower half of the uterus, Fairbairn has investigated the lipids in unembryonated and embryonated *Ascaris* eggs. He expresses his results in terms of lipid concentration as a percentage of total solids in (i) uterine eggs, (ii) de-coated eggs and (iii) egg protoplasm. The values for (i), (ii) and (iii) respectively were, for unembryonated eggs 23 ± 0.8 , 33 and 51 and for embryonated eggs 19 ± 0.5 , 34 and 62. Fractionation revealed that in unembryonated eggs the saponifiables comprised 75% to 80% of the total lipids and consisted of triglycerides and, in much smaller amounts, phospholipids; unsaponifiables contained a very large proportion of ascaryl alcohol and small amounts of unesterified sterols; the large unsaponifiable fraction did not change in amount during embryonation, indicating that the 24% over-all decrease in lipids was attributable to decreases in both volatile and non-volatile triglyceride fatty acids. S.W.

(17c) Fairbairn & Passey describe a technique, using a sequence of chemical and bacterial treatments, for removing the outer shell of *Ascaris* eggs leaving the vitelline membrane intact, and for then removing the membrane for chemical analysis. They have demonstrated that the vitelline membrane consists almost entirely of unsaponifiables, mainly ascaryl alcohol, whereas the larval lipids were mainly saponifiable although significant quantities of ascaryl alcohol were present. Most of the comparatively small amounts of sterols present were contained in the larvae. S.W.

18—Canadian Journal of Comparative Medicine and Veterinary Science.

- a. PULLIN, J. W., 1955.—“Observations on liver lesions in lambs experimentally infected with the cysticercus of *Taenia hydatigena*.” 19 (1), 17–25.
- b. MOYNIHAN, I. W. & STOVELL, P. L., 1955.—“Parasitism of the swan by the nematode *Acu[ar]ia uncinata*.” 19 (2), 48–49.
- c. MCGREGOR, J. K. & MAPLEDEN, D. C., 1955.—“Gastro-intestinal helminthiasis of sheep. A commentary and case report.” 19 (4), 129–131.

(18a) Over a ten-year period an average of 130,000 portions of sheep carcasses in Canada have been condemned annually as a result of parasitic infection. As much of the liver damage in lambs was apparently due to cysticerci of *Taenia hydatigena*, Pullin describes and illustrates the pathological lesions in lambs of marketable age which had been exposed experimentally to infection. Two weeks after exposure there were haemorrhagic wavey tracts on the surface and in the depth of the liver. Tiny cysts protruded from numerous circular wounds on the surface and some cysts were present in cloudy fluid in the abdominal cavity. There were numerous foci of early scarring and eosinophilic infiltration both on the surface of the liver and in the deeper parenchyma of the liver. One month after exposure to infection the liver lesions consisted of a core of necrotic cellular detritus surrounded by granulation tissue encapsuled by a band of proliferating connective tissue and capillaries. The majority of the lesions were in the capsule of the organ. At two months the surface of the liver showed multiple fibrotic nodules and fibrotic tracts in its substance and there were numerous degenerating cysts in the omentum. At three months there were numerous fibrotic nodules on the surface and many degenerate cysts and fibrous tracts in the depth of the liver. Proliferating fibroblasts and capillaries had invaded and reduced the size of the necrotic cores. The viable cysts in the omentum did not exceed 20 mm. in diameter. R.T.L.

(18b) A swan, *Cygnus olor domesticus*, from a zoological garden had cachexia, emaciation and ruffled feathers with severe proventriculitis associated with an *Acuaria uncinata* infection. There were haemorrhagic, nodular ulcerations in the proventriculus. D.M.

(18c) The salient features of gastro-intestinal helminthiasis in sheep are emphasized. In Canada the most serious parasites are *Haemonchus contortus* and *Oesophagostomum columbianum*. *Ostertagia* spp. and trichostrongyles are less important, but all these species in combination produce profound disease. Thirty-five sheep suffering from advanced helminthiasis were treated with phenothiazine at the rate of 25 gm. in one dose per adult. Those showing advanced anaemia were also given intramuscularly 150 mg. of ferrous iron in saline plus 300 international units of vitamin B₁₂. A week later there was an over-all improvement and the output of ova in the faeces was reduced to insignificance. Flock owners are advised to use phenothiazine both for therapeutic and preventive treatment, to feed more concentrates and extra hay when the pasture is poor and, where practicable, to rotate the sheep on fresh pasture as often as possible.

R.T.L.

19—Canadian Journal of Zoology.

- a. CHOQUETTE, L. P. E., 1955.—“The life history of the nematode *Metabronema salvelini* (Fujita, 1920) parasitic in the speckled trout, *Salvelinus fontinalis* (Mitchill), in Quebec.” 33 (1), 1-4.

(19a) Larvae of *Metabronema salvelini* have been found by Choquette free in the body-cavity of about 40% of the nymphs of *Hexagenia recurvata* and occasionally in nymphs of *Polymitaercys* sp. Parasite-free trout were successfully infected and gave adult *M. salvelini* in 60 to 70 days. The third larval stage in *Hexagenia* and the fourth larval stage in the trout are described and illustrated.

R.T.L.

20—Deutsche Tierärztliche Wochenschrift.

- a. BOCH, J., 1955.—“Untersuchungen über die Verbreitung von Magen-Darmstrongyliden bei Weiderindern.” 62 (9/10), 89-93.
b. SPREHN, C., 1955.—“Über die Bekämpfung der Magenwurmseuche (parasitäre Gastro-Enteritis) der Ziegen.” 62 (17/18), 165-168.

(20a) As part of a comprehensive survey of the parasites of domestic animals in Bavaria, Boch here reports on the incidence of gastro-intestinal helminths in cattle at pasture. A total of 7,800 faecal specimens from 145 districts showed 55.5% to be infected. Stomach worm infections were either *Haemonchus* or *Trichostrongylus* alone or a mixed infection of one of these with *Ostertagia*, *Cooperia*, *Nematodirus* and *Oesophagostomum*. Hookworms and cestodes were rare and then only in young animals. The often over-populated pastures are infected in spring by “silent” carriers and the spread of disease is facilitated by antiquated and uneconomic permanent pasture methods and by faulty hygiene. Veterinary surgeons are urged to combine systematic treatment of all infected animals, before they are put out to pasture, with advice on up-to-date pasturing methods.

A.E.F.

(20b) Sprehn points out that parasitic gastro-enteritis is the most serious helminth infection of goats and goes on to lay down basic principles for its control. All infected animals should be given anthelmintic treatment: phenothiazine (in pill or tablet form) is recommended against *Haemonchus* and *Ostertagia* while Badil (a hexamethyl-*p*-rosaniline chloride preparation) is to be preferred against *Trichostrongylus* and *Nematodirus*. Concurrently with the treatment of infected goats thorough cleansing and disinfection of stalls must be carried out. Sprehn describes his experiments with a proprietary disinfectant, Euphagol VA, which in a 10% aqueous solution effectively inhibits development of ova when applied at a rate of 0.4 litres per square metre on bedding straw. The disinfectant should also be applied on the walls up to a height of one metre, and a second (and even a third) application should be made at 10-day intervals.

A.E.F.

21—East African Medical Journal.

- a. JORDAN, P., 1955.—“Filariasis in the Central Province of Tanganyika.” **32** (1), 15–16.
 b. MUGANWA, P. S., 1955.—“Elephantiasis of scrotum.” **32** (1), 30.

(21a) During a filarial survey by a team from the Filariasis Research Unit of the East Africa High Commission 2,623 night blood specimens were obtained in ten villages in the Central Province of Tanganyika but only two of them showed microfilariae of *Wuchereria bancrofti*. The absence of any large expanse of water and the low rainfall produce unsuitable conditions for the transmission of filarial infection, even when suitable temperatures prevail and mosquitoes are prevalent. R.T.L.

(21b) Muganwa describes seven cases of elephantiasis of the scrotum or vulva, which were treated in Mbale hospital, and is of the opinion that treatment with hetrazan may cause violent reactions whereas surgical removal of the elephantoid tissue gave good results and was not unduly difficult. Microfilariae of *Onchocerca* were demonstrated in one case. S.W.

22—Experimental Parasitology. New York.

- a. KUNTZ, R. E. & MALAKATIS, G. M., 1955.—“Susceptibility studies in schistosomiasis. III. Infection of various experimental hosts with *Schistosoma haematobium* in Egypt.” **4** (1), 1–20.
 b. ROGERS, W. P., 1955.—“Amino acids and peptides excreted by nematode parasites.” **4** (1), 21–28.
 c. YAMAGUTI, S., INATOMI, S. & KIMURA, M., 1955.—“Recovery of a chemical fraction from human nightsoil having an ovistatic effect upon *Ascaris lumbricoides* eggs.” **4** (1), 29–33.
 d. HENION, W. F., MANSOUR, T. E. & BUEDING, E., 1955.—“The immunological specificity of lactic dehydrogenase of *Schistosoma mansoni*.” **4** (1), 40–44.
 e. HUNTER, W. S. & VERNBERG, W. B., 1955.—“Studies on oxygen consumption in digenetic trematodes. I.” **4** (1), 54–61.
 f. MANTER, H. W., 1955.—“The zoogeography of trematodes of marine fishes.” **4** (1), 62–86.
 g. YAMAGUTI, S., INATOMI, S. & KIMURA, M., 1955.—“Experimental studies on ovidical substances occurring in human nightsoil.” **4** (2), 87–91.
 h. STIREWALT, M. A. & EVANS, A. S., 1955.—“Serologic reactions in *Schistosoma mansoni* infections. I. Cercaricidal, precipitation, agglutination, and CHR phenomena.” **4** (2), 123–142.
 i. WEBBER, W. A. F. & HAWKING, F., 1955.—“Experimental maintenance of *Dirofilaria repens* and *D. immitis* in dogs.” **4** (2), 143–164.
 j. MOON, A. P. & HUNTER, III, G. W., 1955.—“Studies on schistosomiasis. VIII. Failure of copper oleate to afford complete protection to mice against *Schistosoma mansoni*.” **4** (2), 165–171.

(22a) Kuntz & Malakatis have tested albino rats and mice, hamsters, cotton-rats, guinea-pigs, cats, dogs, rabbits, goats, monkeys (*Cercopithecus*) and baboons (*Papio hamadryas*) for susceptibility to infection with *Schistosoma haematobium*. All the mice and hamsters became infected, although there was considerable individual variation in susceptibility. In mice more adult parasites were recovered than in hamsters but in hamsters the schistosomes were found in the veins near the urinary bladder and lower parts of the large intestine. In unisexual infections in mice, most of the worms were found in the liver. The other animals tested, except monkeys and baboons, were either refractory or produced very few or abnormal schistosomes. Monkeys and baboons were satisfactory in that the pathological conditions found were comparable with those found in man but there was considerable individual variation in susceptibility. S.W.

(22b) Rogers examined the peptides and amino-acids excreted by *Ascaridia galli*, *Ascaris lumbricoides* and *Nematodirus* spp. The excretory products were obtained by culturing the parasites in a saline medium containing streptomycin and penicillin. Qualitatively the materials excreted by the different parasites were similar and at least three peptides and seven free amino-acids were detected in the culture medium of each of the parasites. W.P.R.

(22c) Yamaguti *et al.* have examined extracts of a 1:4 mixture of human faeces and urine for ovistatic effects on *Ascaris lumbricoides* eggs. A fraction which was insoluble in ether and ethanol, but soluble in acetone and water, was found to inhibit development. W.P.R.

(22d) Henion *et al.* prepared an antiserum from fowls against lactic dehydrogenase of *Schistosoma mansoni*. The antiserum inhibited the enzyme and also that prepared from *S. japonicum*. However, it did not inhibit lactic dehydrogenase from rabbit muscle. Reduced diphosphopyridine nucleotide protected the schistosome enzymes from the inhibitory effect of the antiserum. W.P.R.

(22e) Hunter & Vernberg have studied the oxygen consumption of various stages of *Gynaecotyla adunca* using Cartesian diver respirometers. The Pappus and the Ellipse formulae were used for determining comparative volumes in all stages except the metacercaria where no satisfactory volume determinations could be made. Observations on all stages studied were made at 30.4°C., and also at 23.6°C. on adults immediately after excystment. The average results expressed as microlitres per hour per cubic millimetre were: free-living cercariae 5.35, cercariae just before encysting in the crab 0.159, adults immediately after excysting (at 23.6°C.) 0.130 and (at 30.4°C.) 0.290, 24, 48 and 72 hours after excysting 0.153, 0.120 and 0.104 respectively. For metacercariae the oxygen consumption averaged 5.62×10^{-3} microlitres per hour per metacercaria. Unsuccessful attempts were made to study the rate of oxygen consumption at temperatures approaching those of the bird host and the possible reasons for their failure are discussed. S.W.

(22f) In this review Manter considers the host and geographical distribution of a large number of digenetic trematodes of marine fish and of the Gyrodactyloidea. From his own observations he concludes that the number of species of parasites is probably from 80% to 100% of the number of host species and that host specificity in trematodes of marine fish is considerable and is more marked in warm seas. He compares the species found in a number of regions where trematodes have been more or less extensively collected and finds that, although a large number of species in each region is peculiar to it, there are strong similarities between the European Atlantic and the Mediterranean, Tortugas (shallow water) and Bermuda, and Tortugas (shallow water) and tropical American Pacific; there are considerable similarities between Tortugas (deep water) and distant cold seas, New Zealand, the North Atlantic and the North Pacific, the Red Sea and the warm Pacific, and Celebes and Japan; there is a strong dissimilarity between deep and shallow waters at Tortugas, Tortugas (shallow water) and the North Atlantic, and the Mediterranean and the Red Sea. In general the distribution agrees with that which has been observed in other phyla. The evidence presented in confirmation of the probable origins and relationships by the parasites of *Lota lota*, *Apoldinotus grummiens*, *Coregonus*, the Cyprinidae, *Anguilla* spp. and *Galaxias* is cited. S.W.

(22g) Yamaguti *et al.* have shown that a mixture of human nightsoil, raw fish viscera and superphosphate of lime, inoculated with *Escherichia coli*, is markedly ovicidal to eggs of *Ascaris lumbricoides*. An acetone insoluble fraction of an acidulated faecal mixture was ovistatic but not ovicidal. S.W.

(22h) Stirewalt & Evans have repeated the work of a number of investigators on the *in vitro* behaviour of trematode cercariae in sera from uninfected and schistosome-infected hosts. They were especially careful to reproduce procedures exactly to eliminate the possibility that different results might be attributed to differing techniques. CHR ("Cercarienhiillen" of Vogel & Minning, or pericercarial envelope) appears to be a unique serological phenomenon, possibly related to the swelling of bacterial capsules or the development of bacterial films in antisera, or the formation of fertilization membranes. Agglutination is correlated with a weak or slowly formed CHR or to the stickiness of oral secretions from the cercariae. All sera from rats, rabbits and guinea-pigs were strongly cercaricidal; mouse and hamster sera were non-cercaricidal; cercaricidal activity was normally accompanied by precipitate formation although neither appeared to be related to schistosome infection. The presence of cercaricidal factor was inhibitory to CHR unless inactivated by heat. All infected sera were CHR positive and this is an acquired reaction to the presence of living schistosomes or schistosomula; it is not completely thermostable and takes place only around living cercariae. It was not possible

to exhaust serum of CHR factor by repeatedly transferring large numbers of cercariae to it or by maintaining adult worms in it for 24 hours but cercarial exhaustion was demonstrated. The possible value of CHR in the diagnosis of latent or unisexual infections is discussed. S.W.

(22i) *Dirofilaria repens* from Sardinia and a Chinese strain of *D. immitis* have been maintained in dogs in the laboratory for six and three years respectively. Both showed periodicity, the maximum number of microfilariae in the peripheral blood occurring about midnight in *D. repens* and about 6 p.m. in *D. immitis*. *Anopheles stephensi* was the most satisfactory intermediary for *D. repens* although development would take place in other mosquitoes; none of the mosquitoes studied were very effective for *D. immitis* although some infective larvae developed in *Aedes aegypti* and *A. albopictus*. The early migrations in the dogs and a case of infection in which there was no microfilaraemia are described and data on the prepatent and patent periods presented. S.W.

(22j) Various copper oleate preparations were tested against *Schistosoma mansoni* cercariae in water. Water saturated with copper oleate killed all cercariae in 30 minutes and 20% copper oleate in ether killed them in two hours; solid copper oleate had little effect in two hours. When applied as an ointment to the shaved bellies of mice it gave over 90%, but not complete, protection. As this ointment gives complete protection against *S. japonicum* cercariae it is suggested that there is a physiological difference between the two species of cercariae. S.W.

23—Farming in South Africa.

- a. ALEXANDER, R. A., 1955.—“Veterinary Services. A.—Research. Helminthology.” [Report of the Department of Agriculture for the year ended 31 August, 1954.] 30 (348), 137–138.
- b. REYNEKE, J., 1955.—“Tobacco diseases and pests.” [Report of the Department of Agriculture for the year ended 31 August, 1954.] 30 (348), 168, 197–198.

(23a) Comparative trials have shown that tetrachlorethylene is more effective than phenothiazine against hookworms and trichostrongyles in sheep provided it is swallowed into the abomasum. In 10% of the animals however this does not happen and it is recommended that the drug should be given at least twice at short intervals. As phenothiazine is almost 100% effective against hookworms whether it is deposited in the abomasum or the rumen, dosing with the drug should be done without first administering copper sulphate solution. It has been found that when measly meat is made into biltong the danger of infection with tapeworm is almost eliminated. Sheep were experimentally infected by feeding with paramphistome cercariae from *Bulinus tropicus*. It is thought that the paramphistomes of sheep and cattle hitherto regarded as identical may be two different forms. R.T.L.

(23b) In South Africa eelworm infestation of soils is the most important factor restricting the cultivation of tobacco particularly on lighter soil types. Badly infested soils on which tobacco would normally be doomed to failure produce normal crops when treated with D-D mixture at the rate of 80 to 120 gallons per morgen or ethylene dibromide at the rate of 40 to 60 gallons per morgen. These treatments have however to be repeated each year before planting. Different systems of crop rotation with maize, wheat, oats and sunn-hemp failed to control eelworm on badly infested soils. R.T.L.

24—Gardening Illustrated.

- a. CHALLENGER, S., 1955.—“The eelworm problem and its control.” 72 (1), 16–17.

(24a) Challenger gives a general survey of the eelworm parasites of garden plants, mentioning several species of *Heterodera*, root-knot eelworms, stem and bulb eelworm, and leaf and bud eelworms. He indicates the chief means of control, namely crop rotation, warm-water treatment of infested plants and soil treatment with chemicals or steam in the case of glass-houses. He emphasizes the importance of these eelworms and the difficulties of control. M.T.F.

25—Horticultural News. New Jersey State Horticultural Society.

- a. MERRILL, Jr., L. G. & REED, J. P., 1955.—“Sweet corn growers beat nematodes.” **36** (1), 2854.

(25a) Increased growth and yields of sweet-corn occurred on plots fumigated with D-D mixture (23 gal. per acre) and ethylene dibromide (7 gal. per acre) as compared with non-treated plots. In plant samples from the non-treated plots *Pratylenchus penetrans* was found at the rate of 63 nematodes per gramme of root. Other nematodes found included *Tylenchorhynchus* sp., *Longidorus* sp. and *Hoplolaimus* sp. Aldrin at 3½ lb. per acre sprayed on the soil had no effect on the growth of the crop.

M.T.F.

26—Indian Journal of Medical Research.

- a. VARMA, A. K., 1955.—“A simple method of breeding fresh-water molluscs in the laboratory.” **43** (1), 165–167.

(26a) Limnaeids can be bred successfully in laboratory tanks under Indian conditions by providing them with cooked leaves of *Eichhornia crassipes* or *Ipomoea reptans* in place of the cooked lettuce or cabbage used in European laboratories.

R.T.L.

27—Indian Veterinary Journal.

- a. RAO, N. S. K. & MOHIYUDDIN, S., 1955.—“Nasal schistosomiasis in buffaloes.” **31** (5), 356–358.

(27a) In a buffalo infected with *Schistosoma nasalis* there were minute ulcers and small nodules in the deeper parts of the nasal cavity. Probably other lesions in the deeper parts of the nasal cavities were not visible from outside. After the third of four weekly injections of sodium antimony tartrate at a dosage of 7 grains increasing to 10 grains, no eggs were found in the nasal discharge. A photomicrograph of a section of degenerated granulomatous tissue, voided during sneezing, shows an adult parasite in section.

D.M.

28—Journal of the American Veterinary Medical Association.

- a. SUDDUTH, W. H., 1955.—“Lungworm infection in cats and its possible treatment.” **126** (936), 211–214.
b. JORDAN, J. E., 1955.—“Treatment of canine whipworms (*Trichuris vulpis*) with Whipcide.” **126** (936), 220–222.
c. BURCH, G. R. & BLAIR, H. E., 1955.—“A new ascaricide for swine.” **126** (937), 304–308.
d. EHRENFORD, F. A. & SNODGRASS, T. B., 1955.—“Incidence of canine dirofilariasis (giant kidney worm infection) with a summary of cases in North America.” **126** (938), 415–417.

(28a) *Aelurostrongylus abstrusus*, the lungworm of cats, is reported from Seattle, Washington. Details of diagnosis, pathology and the life-cycle are reviewed. The history of six cases is recorded. Caricide was tried as a cure in one case, but with no success. Dosage was as recommended for filariasis, but adjusted to the weight of the cat. In three cases an intravenous injection of 2.5 c.c. of 20% sodium iodide solution resulted in a rapid improvement in the cats' condition. A total of three injections at 5-day intervals was given, and three days after the last injection no larvae were found in the stools. Checks five months later showed no recurrence of infection.

D.M.

(28b) Jordan reports the results of treating *Trichuris vulpis* infection in 38 dogs with Whipcide. Except in two cases all the dogs received a two-dose treatment, consisting of 200 mg. per kg. body-weight administered both morning and night immediately following half the regular meal. No evidence of toxicity was shown, and the drug was proved to be effective and convenient for the treatment of dogs infected with whipworms.

D.M.

(28c) Data are presented as evidence that Aska-rid, an anthelmintic powder containing 1.5% cadmium oxide, is effective, safe, palatable and convenient to use for *Ascaris* infection in pigs, when mixed at the rate of 1 lb. of Aska-rid to each 100 lb. of ground maize and oats, and fed dry and exclusively for 72 hours. The 14 pigs passed 1,703 *Ascaris* after treatment and were entirely free from worms at autopsy. The cadmium level was highest in the liver, kidney and spleen but the maximum reached on the day after treatment was only 1 mg. per 100 gm. Cadmium oxide has a unique safety feature in that emesis occurs when toxic amounts are consumed and it can be given to pregnant sows.

R.T.L.

(28d) Five additional cases of canine infection with *Diocotophyme renale* are recorded from North America bringing the total number now known to 121. The incidence ranging from 2% to 37% given by earlier writers was based on small numbers of animals examined. Ehrenford & Snodgrass found the parasite in only 0.003% of the 131,152 dogs they autopsied.

R.T.L.

29—Journal of Parasitology.

- a. CORT, W. W., AMEEL, D. J. & VAN DER WOUDE, A., 1955.—“Germinal development in the sporocysts of a bird schistosome *Trichobilharzia physellae* (Talbot, 1936).” 41 (1), 24-39.
- b. WU, L. Y., 1955.—“Studies on *Trichinella spiralis*. I. Male and female reproductive systems.” 41 (1), 40-47.
- c. HARGIS, Jr., W. J., 1955.—“A new species of *Benedenia* (Trematoda: Monogenea) from *Girella nigricans*, the opaleye.” 41 (1), 48-50.

(29a) Cort *et al.* have studied the development of *Trichobilharzia physellae* in *Physa parkeri*. Considerable multiplication of the germinal cells took place during the development of the miracidium. Nearly all mother sporocysts were situated in the mantle. The rate of growth and the size and number of embryos in fully grown sporocysts showed considerable variation. After ten days, although most of the embryos remained small, the first daughter sporocysts escaped and migrated to the digestive gland where they grew rapidly, reaching their maximum size 21 to 24 days after infection. At this time the first cercariae began to mature. Cercariae are first shed after a little more than three weeks but in snails infected in late summer or autumn, the infection may be carried over to the following spring. In small snails the later stages of development are greatly modified and only a small proportion of the daughter sporocysts survive in the digestive gland. Many of the small snails die before the infection reaches maturity.

S.W.

(29b) The morphology of the reproductive system of the males and females of *Trichinella spiralis* is now more fully described than heretofore. The testis is hollow with germinal cells at various stages of spermatogenesis along the whole length of the free border of its wall. The ejaculatory tube enters the cloaca ventrally. The copulatory tube is a real cloaca. It extrudes through the cloacal opening to form the copulatory bell. The ovary is terminal and the ova formed on the ventral wall of its germinal zone are gradually pushed towards the ovarian cavity where they become free. The seminal receptacle is a large, blind pouch, the oviduct entering at its side. The proximal portion of the vagina is a narrow, thin-walled tube; the distal portion is thick-walled with large cells forming its inner wall.

R.T.L.

(29c) *Benedenia girellae* n.sp., from the skin of *Girella nigricans* at La Jolla, California, differs from the most closely related forms *B. melleni* and *B. isabellae* by its greater body size (3.8-6.7 mm. by 1.9-3.2 mm.), by the size and shape of the anchors and by the fact that the oviduct receives the duct from the vitelline reservoir at a small, dextrally placed, flask-shaped structure and then proceeds anteriorly to the ootype. This new species raises the number of avaginate *Benedenia* to five. If this feature warrants some taxonomic separation from other species in the genus, Johnston's subgenera must be considered and integrated.

R.T.L.

29—Journal of Parasitology (cont.)

- d. LOCKER, B., 1955.—“The identification of *Taenia tenuicollis* Rudolphi, 1819, in North America.” **41** (1), 51–56.
- e. BURROWS, R. B. & KLINK, G. E., 1955.—“An abnormal proglottid of *Taenia saginata*.” **41** (1), 56–58.
- f. LEE, S. H., 1955.—“The mode of egg dispersal in *Physaloptera phrynosoma* Ortlepp (Nematoda: Spiruroidea), a gastric nematode of Texas horned toads, *Phrynosoma cornutum*.” **41** (1), 70–74.
- g. VOGEL, M., 1955.—“Notes on four hymenolepidid cestodes from shrews.” **41** (1), 74–76.
- h. SCHILLER, E. L., 1955.—“Studies on the helminth fauna of Alaska. XXIII. Some cestode parasites of eider ducks.” **41** (1), 79–88.
- i. MOORE, D. V., 1955.—“Sexual anomalies in the male *Schistosoma japonicum* (Formosan strain).” **41** (1), 104–108.

(29d) The list of intermediate hosts of *Taenia tenuicollis* is now enlarged by the inclusion of *Microtus pennsylvanicus modestus* (in Montana), *M. oeconomus* (in Alaska), *Ondatra zibethica* (in Montana and Alaska), *Peromyscus maniculatus rubidus* (in Oregon), *P. maniculatus artemisiae* (in Montana), and *Aplodontia rufa* (in Oregon). Although one larval form of *T. tenuicollis* is a cysticercus and the other is a coenurus, the size, shape and number of the hooks are indistinguishable. The adult is now recorded from *Mustela vison* and *M. erminea invicta* in Montana.

R.T.L.

(29e) The strobila of a complete *Taenia saginata* was normal except for a single proglottis which had the appearance of an unequal dichotomy. Although there was no external evidence of fusion, staining revealed two complete and separate reproductive systems.

R.T.L.

(29f) In *Physaloptera phrynosoma*, a common nematode of the horned toad *Phrynosoma cornutum*, the eggs in the two uteri are at first evenly distributed but they become segregated into masses, each containing from 5 to 69 eggs. The uterine epithelium then encapsulates them in five layers, each of increased thickness. The female worms containing these egg capsules are expelled alive in the faeces and become dried. The embryonated eggs can remain viable within the uterus for over a year. No *Physaloptera* from a mammalian host presents these features, viz., a unique mode of egg dispersal, the formation of egg capsules and the development of the larvae within the egg. An addendum states that the correct name for this species is *Skrjabinoptera phrynosoma*.

R.T.L.

(29g) *Hymenolepis spenophorus* from *Sorex vagrans*, *H. macyi* from *S. trowbridgei*, *H. kenki* from *S. pacificus*, and *H. falcata* from *S. palustris*, *S. vagrans* and *S. ornatus* are new locality and host records for California. *H. spenophorus* is now reported from *Sorex* sp. in Alaska. *H. macyi* was originally described as lacking a rostellum but a small unarmed rostellum has now been observed. It is usually obscured by the prominent suckers.

R.T.L.

(29h) Schiller has identified six cestodes from eider ducks in Alaska and records the localities where they were collected. He gives additional morphological characters for some of the poorly known species. Two species from Point Barrow, Alaska, are new, viz., *Haploparaxis* [*Aploparaxis*] *polystictae* n.sp. from *Polysticta stelleri* and *Hymenolepis arctica* n.sp. from *Somateria spectabilis*, *S. mollissima* var. *nigra* and *Arctonetta fischeri*. In *Haploparaxis polystictae* the genital ducts pass dorsal to the poral, and ventral to the aporal longitudinal excretory vessels, a feature apparently new and possibly unique in this genus. The trypanosome-like shape of the testes in the premature segments of *Hymenolepis arctica* is a useful aid in its recognition.

R.T.L.

(29i) Moore reviews the anomalies of the genital organs previously reported in schistosomes and reports the finding of hermaphrodite males and males with supernumerary testes in a Formosan strain of *Schistosoma japonicum*. The Chinese and Japanese strains examined were normal.

R.T.L.

29—Journal of Parasitology (cont.)

- j. SANDGROUND, J. H. & MOORE, D. V., 1955.—“Notes on the rearing of *Oncomelania* spp. in the laboratory.” 41 (1), 109–113.
- k. COIL, W. H., 1955.—“Growth and variation in *Catoptroides lacustri* Loewen, 1929.” 41 (1), 113–114.
- l. GRUNDMAN, A., PARKER, D. & STAGG, G., 1955.—“Huge helminth cyst found in the black-tailed jackrabbit.” 41 (1), 114.
- m. GRIFFITHS, H. J., 1955.—“*Stagnicola palustris* (Müller), an intermediate host for *Fascioloides magna* (Bassi, 1875), in Minnesota.” 41 (1), 115.
- n. WOOD, R. A. & MIZELLE, J. D., 1955.—“Another case of *Ascaridia galli* in a hen's egg.” 41 (1), 115.
- o. PHILIP, C. B., 1955.—“There's always something new under the 'parasitological' sun (the unique story of the helminth-borne salmon poisoning disease).” [Presidential Address.] 41 (2), 125–148.

(29j) The various species of *Oncomelania* are the most difficult of the schistosome vectors to breed and maintain in an artificial environment. A modification of the method of supplying *Oncomelania* with the alginate food introduced by Standen is described. A generous portion of warm sodium alginate mixture is poured into a developing tray 11 inches by 14 inches. A sheet of paper towelling is immersed in the mixture for a few seconds and then drawn over the edge of the tray to remove excess. The sheet is then put into a clean tray and flooded with a 2.5% aqueous solution of calcium chloride, rinsed in water, cut into one-inch strips and stored in water at 6°C. To feed the *Oncomelania* the paper strip is set in the aquaterrarium so that the end dips into the water reservoir while the remainder extends on to the earthen bank. The snails soon migrate on to the strip. When new strips are added to the earthen bank the older strips are submerged in the water reservoir and may be removed to prevent the accumulation of debris. The introduction of *Collembola* contributes to the biological balance of the aquaterrarium and eliminates fungal growth, especially on the moist earthen bank. R.T.L.

(29k) Coil examined 103 specimens of *Catoptroides lacustri* obtained from 36 *Ictalurus lacustris*. The worms were all collected at the same time, fixed together and stained by the same method. All the hosts were approximately the same size and there was no crowding of the parasites. Two characters, the degree of symmetry of the testes and the presence or absence of a posterior notch, are shown to be very variable and are therefore considered to be invalid for the differentiation of genera. Measurements were made of various organs and their size relative to body length investigated. The body length increases more rapidly than do the suckers and more than twice as rapidly as does the body width: it appears that the growth and filling of the uterus with eggs is not the only cause of increasing length. S.W.

(29l) An enormous mass of mature coenuri and daughter cysts distended the abdomen of a jack-rabbit, *Lepus californicus deserticola*. At the initial incision of the abdomen, the pressure caused the liquid contents to be sprayed over the operators and the surrounding areas. The mass contained several hundred coenuri with several thousand scolices. Large numbers of thin-walled, apparently newly formed daughter cysts were attached to the parent coenuri by stalks. R.T.L.

(29m) In Minnesota the white-tailed deer, *Odocoileus virginianus*, is the natural host of *Fascioloides magna* which causes a high mortality in sheep. The losses in cattle are chiefly confined to liver condemnation. *Stagnicola palustris* were experimentally infected and the metacercariae were fed to guinea-pigs. At autopsy seven weeks later immature *F. magna*, 4 mm. to 8 mm. long, were found free in the peritoneal cavity and in necrotic haemorrhagic subserous tracts. None were present in the liver. So far no natural infections of *S. palustris* have been discovered. R.T.L.

(29o) Salmon poisoning disease acquired by dogs through eating infected fish is an instance of a relatively new field for exploration, viz., the role of endoparasites in the transmission of infectious diseases in the higher vertebrates. The disease is caused by the only

29—Journal of Parasitology (cont.)

- p. BYRD, E. E. & FITE, F. W., 1955.—“Studies on the anatomical features of *Multiceps packi* Christenson, 1929, a cestode parasite of the dog.” **41** (2), 149–156.
- q. TROMBA, F. G., 1955.—“The rôle of the earthworm, *Eisenia foetida*, in the transmission of *Stephanurus dentatus*.” **41** (2), 157–161.
- r. NORMAN, L., SADUN, E. H., REDDING, R. W. & COOPERRIDER, D. E., 1955.—“Flocculation test in sera from hogs experimentally and naturally infected with *Trichinella spiralis*.” **41** (2), 162–166.

Rickettsia-like agent known to have become adapted to a helminth vector. This adaptation is an efficient one as a high proportion of fish carry the infective flukes *Nanophyetus salmincola*. The endemic area in which dogs are infected extends northwards from north-western California, along the Pacific slopes of the Cascades through Oregon and parts of the Olympic Peninsula in Washington, and is determined by the distribution of the molluscan vector *Goniobasis silicula*. The natural cycle of the infectious agent is intimately associated with this restricted distribution of the fluke and its molluscan vector rather than with the more widely dispersed salmonid fish vectors. Eleven out of 13 dogs became ill when fed with heavily parasitized fingerling trout obtained from an Oregon fish factory. The chief gross lesion is enlargement of the visceral lymph nodes and other lymphoid tissues. *Rickettsia*-like bodies were observed in the cytoplasm of numerous reticulo-endothelial cells. No undoubted organisms were recognized in sections of flukes but there were peculiar staining elements in the shell gland cells and in unladen eggs. The intense rate of infection in fluke-bearing fish was confirmed by feeding experiments. As about 90% of infected dogs die within a week, it was thought unlikely that they provide for natural maintenance of the infection and raccoons fell under suspicion but, like guinea-pigs, hamsters and mice, they appeared to be almost refractory. It is thought unlikely that there is a homiothermic vertebrate reservoir. Two attempts to infect dogs by eggs from adult flukes recovered from severely infected dogs failed. The fluke vector *G. silicula* will probably be cast eventually as the reservoir. R.T.L.

(29p) Although Clapham has presented rather convincing evidence in support of the view that *Multiceps packi* is a synonym of *M. multiceps*, Byrd & Fite, after a detailed study of a small collection of cestode fragments from a dog, have identified them as *M. packi*. Three of the scolices and their attached segments were triradiate throughout their length, while four specimens were normal. R.T.L.

(29q) Although several investigators have shown experimentally that pigs can acquire *Stephanurus dentatus* either by the entrance of the infective larvae through the skin or by the mouth, Spindler has informed the author that he had been unable to produce patent infections in pigs kept under conditions designed to preclude extraneous infection and observed for a year or more. Tromba, having similarly failed to induce direct infection, sought an intermediate host among the Lumbricidae by experimental infection. After four days, larvae morphologically identical with third-stage larvae but lacking sheaths were found in the brown bodies of *Eisenia foetida* and *Lumbricus terrestris*, in the latter in association with *Rhabditis pellio*. Infected earthworms were then fed to pigs. At autopsy, the liver of all the pigs showed typical lesions of stephanuriasis containing fourth-stage larvae. This association between *E. foetida* and *Stephanurus dentatus* is provisionally regarded as facultative. R.T.L.

(29r) From the experiments reported in this paper it is concluded that the flocculation test of Bozicevich *et al.* (in *Publ. Hlth Rep., Wash.*, 1951, **66**, 806–814) is reliable only in detecting heavy infections of *Trichinella spiralis* in pigs if the serum is obtained within a few weeks of their ingestion of infected meat. It failed if the serum was taken earlier than the second week or if the infection was a light one. Melcher's antigen (in *J. infect. Dis.*, 1943, **73**, 31–39) appeared to be more sensitive in detecting infections at an earlier stage and for a longer period. The age of the pigs when infected may also be important in the detection of specific antibodies by the flocculation test. R.T.L.

29—Journal of Parasitology (cont.)

- s. SENGER, C. M., 1955.—“Observations on cestodes of the genus *Hymenolepis* in North American shrews.” **41** (2), 167–170.
- t. ROBINSON, Jr., E. J., 1955.—“A description of attempts to infect mosquitoes with avian filarial worms.” **41** (2), 176–178.
- u. HARGIS, Jr., W. J., 1955.—“Monogenetic trematodes of Gulf of Mexico fishes. Part II. The superfamily Gyrodactyloidea. (Continued.)” **41** (2), 185–193.
- v. LINDQUIST, W. D. & LI, S. Y., 1955.—“Some nematodes of rats from Guam, M.I. and notes on a species of *Rictularia*.” **41** (2), 194–197.
- w. LUTTERMOSER, G. W., 1955.—“Studies on the chemotherapy of experimental schistosomiasis III. Harvest of *Schistosoma mansoni* cercariae by forced nocturnal emergence from *Australorbis glabratus*.” **41** (2), 201–208.

(29s) Senger has re-examined the type specimens of 15 species of *Hymenolepis* described from North American shrews and corrected inaccuracies in several of the original descriptions. As a result, *Hymenolepis lineola* must be considered a synonym of *H. parva*. In *H. schilleri*, the median testis in each immature segment is anterior, not posterior, to the lateral testes. The hooks in *H. intricatus* are now illustrated correctly. The cestode identified by Neiland in 1953 as *H. longi* Oswald, 1951 is thought to be identical with *H. parvissima*. *H. pauciglottis* has 13, not 12, rostellar hooks and the paratype has 14. Although the type of *H. macyi* has no rostellum, a vestigial body takes its place. Some authors have placed considerable emphasis on the number and length of the rostellar hooks which is not considered justifiable in view of the apparent variability of several species. It is suspected that *H. longi*, *H. pauciglottis* and *H. parvissima* may be only subspecies or races. No single character can be relied upon to distinguish the hymenolepids of shrews in North America but probably the most important is the shape of the rostellar hooks taken together with the general body morphology.

R.T.L.

(29t) None of the 13 species of mosquitoes used were found to serve as good intermediate hosts for microfilariae of dipetalonematids in crows, blue jays, white-throated sparrows and several species of cardinals. The only development seen occurred in the thoracic muscles of a few *Aedes aegypti*. In one specimen abortive “sausage” forms were found on the eighth day.

R.T.L.

(29u) Two known and four new species of monogenetic trematodes belonging to the Tetraonchinae are described and figured from the gills of marine fishes in Florida. *Ancyrocephalus lactophrys* (MacCallum, 1915) from *Lactophrys tricornis* and *A. parvus* Linton, 1940 from *Tylosurus marinus* are new to this locality. The new species are *A. balisticus* n.sp. from *Balistes carolinensis*, *A. felis* n.sp. from *Galeichthys felis*, *Hamatopeduncularia bagre* n.sp. from *Bagre marinus* and *Pseudohaliotrema carbunculus* n.sp. from *Lagodon rhomboides*. As the taxonomy of the Tetraonchinae is so unsettled and their diagnostic criteria so ill defined Hargis is unable to accept Yamaguti's subgenera of *Pseudohaliotrema*.

R.T.L.

(29v) In the 45 *Rattus rattus* autopsied in the island of Guam, the only unusual nematode found was a species of *Rictularia* closely resembling *R. tani* Hoeppli, 1929 except for the size range and the level of the transition of the last pair of combs to spines. These may, however, be individual variations.

R.T.L.

(29w) *Australorbis glabratus* were each exposed on the same day to five or ten miracidia of the Puerto Rican strain of *Schistosoma mansoni* and the daily and weekly output of cercariae was studied. When the snails were kept at 30°C. and artificial light was alternated with darkness every twelve hours, large numbers of cercariae were discharged during or immediately after the light periods every second or third day. When the light periods were reversed, the times of emergence were also reversed. In two instances when the periods of darkness were prolonged for 24 and 36 hours, the two highest peaks of emergence occurred in the succeeding light periods. When the snails were placed in a box with automatic light control in the evening, cercarial emergence was forced from 3 a.m. to 9 a.m. on the following day. This method gave sufficient cercariae for the heavy, experimental exposures of many animals on the same day.

R.T.L.

29—Journal of Parasitology. (cont.)

- x. ROBINSON, Jr., E. J., 1955.—“Observations on the epizootiology of filarial infections in two species of the avian family Corvidae.” **41** (2), 209–214.
- y. MANN, P. H. & FRATTA, I., 1955.—“Observations on the experimental transfer of the microfilariae of *Dirofilaria immitis* to the mouse, rat, and the chick embryo.” **41** (2), 218.
- z. KELLEY, Jr., G. W., 1955.—“The daily egg production of *Haemonchus contortus* (Nematoda) in a calf.” **41** (2), 218–219.
- ba. SCOTT, J. A., 1955.—“Preparation and use of glychrogel mounting medium.” **41** (2), 219.
- bb. TONN, R. J., 1955.—“The white sucker, *Catostomus commersonii* (Lacepede), a new host of *Garyophyllaeus terebans* (Linton, 1893).” **41** (2), 219.

(29x) A study was made of the natural occurrence of microfilariae in specimens of *Corvus brachyrhynchos* and *Cyanocitta cristata*, collected monthly in south-eastern Georgia from February 1952 to October 1953, to develop epizootiological data which would give an indication of the arthropod group to which the unknown vector belonged and to determine factors influencing the natural transmission of the worms. In the crows, the microfilaria was sheathed and blunt-tailed. In the jays, the microfilaria was unsheathed and had a sharp tail. Both belonged to the Dipetalonematidae. The infection in the crows averaged 80% between the breeding seasons, reaching 100% for a short time and declining during the nesting period. Age of host was correlated with the infection rate. In fledglings and young adults the rate was lower than in those over six months old but a surprising percentage of even the youngest birds shot had a patent infection. The periodicity of these microfilariae was strictly nocturnal and could be reversed artificially. The infection rate of 80% in the crows and 65% in the jays was relatively constant, with a drop of about 40% during the breeding season. The arthropod vectors were not ascertained but it is suggested that both species were transmitted mainly or entirely in the nest and that a single species of vector is involved. R.T.L.

(29y) When blood containing microfilariae of *Dirofilaria immitis* was injected intraperitoneally into Wistar rats and Swiss mice, the majority were destroyed during the first week but viable microfilariae were found in the peripheral blood for as long as three weeks. Hyaluronidase, cortisone or ACTH did not increase the number of circulating microfilariae. When the chorioallantoic sacs of developing chick embryos were inoculated with microfilariae centrifuged from dog's blood laked with sterile distilled water and suspended in isotonic saline containing penicillin-streptomycin, 50% to 60% remained viable for six days. R.T.L.

(29z) The faeces of a Holstein bull calf with a pure infection of *Haemonchus contortus* contained a daily average over three days of 130 ova per gramme, i.e. a total of 373,360 ova daily. At autopsy 57 mature females and 22 males were recovered. This means that an average of 6,550 ova per day was laid by each female *H. contortus*. No other parasitic worms were present. Thus if four cows with 50 female *H. contortus* each were pastured on 10 acres, nearly 30 ova would be deposited daily on a square yard. R.T.L.

(29ba) Glychrogel mounting medium is modified by adding 8 gm. Knox gelatin in 80 ml. of hot distilled water and stirring it in a water-bath until it is thoroughly dissolved. 32 ml. of glycerin, a crystal of camphor and 0.05 gm. of chrome alum dissolved in 48 ml. of distilled water are added. About 20 ml. is transferred to a small flask for current use and the stock kept in a refrigerator. A different technique is suggested for small filarial worms. These are fixed in 70% ethyl alcohol at 70°C., transferred to cold 70% alcohol containing 5% glycerin, and loosely covered with paper. A small amount of 50% glycerin and alcohol is added next day, and a few drops of glycerin daily thereafter. The filaria is mounted by transferring it to a drop of glychrogel taken from a flask contained in a 65°C. water-bath. R.T.L.

30—Journal of Pharmacy and Pharmacology. London.

- a. BECKETT, A. H., DONBROW, M. & JOLLIFFE, G. O., 1955.—“Ascaridole studies. III. The purification and characterisation of ascaridole.” **7** (1), 55–65.

31—Journal of Tropical Medicine and Hygiene.

- a. CRIDLAND, C. C., 1955.—“The experimental infection of several species of African freshwater snails with *Schistosoma mansoni* and *S. haematobium*.” 58 (1), 1-11.

(31a) Using laboratory-bred mice as definitive hosts, Cridland found that at least five species of *Biomphalaria* (*B. choanomphala*, *B. adowensis adowensis*, *B. sudanica sudanica*, *B. s. tanganykana*, *B. rüppellii*) should be considered as vectors of *Schistosoma mansoni* in East Africa. The lowest infection rate (8%) was obtained with *B. s. sudanica* while in the highly susceptible *B. a. adowensis* the rate of infection varied from 66% to 100%. None of these five species was susceptible to infection with *S. haematobium*. Cridland suggests that the difference in infection rates between the two closely related species *B. s. sudanica* (8.23%) and *B. s. tanganykana* (28.49%) appears to justify the taxonomic distinction drawn between them. Cridland also found that *Bulinus (Physopsis) nasutus* and *B. (P.) globosus globosus* were susceptible to infection with *S. haematobium* but not *S. mansoni* and although *B. g. globosus* is not a common species in Uganda both must be considered as vectors of *S. haematobium*. The East African species of Planorbinae, Bulininae and Limnaeidae which proved refractory to experimental exposure to both *S. mansoni* and *S. haematobium* are listed.

D.L.H.R.

32—Laboratory Practice. London.

- a. PARFITT, J. W., 1955.—“Two techniques used for the detection and enumeration of the larvae of *Dictyocaulus viviparus* in faeces and herbage.” 4 (1), 15-16.

(32a) As a count of one larva in 10 gm. of cattle faeces is of significance in parasitic bronchitis, the standard techniques for detecting the eggs and larvae are inadequate. Parfitt describes in detail the apparatus required and the techniques devised by him for estimating the number of *Dictyocaulus viviparus* larvae (i) per gramme of faeces and (ii) in herbage. Free-living nematodes in the grass samples were killed by Gram's iodine. When a number of larvae were placed on grass the average recovery was 43%. The technique can be used also for the detection and enumeration of larvae of *Dictyocaulus filaria*, trichostrongylids from cattle, sheep and goats and *Trichostrongylus axei* and red worms from horses.

R.T.L.

33—Medical Journal of Malaya.

- a. PALLISTER, R. A., 1955.—“Piperazine in the treatment of ascariasis.” 9 (3), 212-215.

(33a) Piperazine citrate is, in Pallister's experience, much more efficient than santonin and probably better than chenopodium oil or tetrachlorethylene in the treatment of ascariasis in man. A three-day course, without diet restrictions or purgatives, is very satisfactory for in-patients. It may be given to very ill patients without disturbing them and is especially useful for malnourished and debilitated children. Cases in which hookworms were also present still showed hookworm ova in the faeces after treatment.

R.T.L.

34—Nature. London.

- a. BROWN, E. B., 1955.—“A seed-borne nematode infestation in annual asters.” [Correspondence.] 175 (4447), 178.
 b. BULL, P. C., 1955.—“Population regulation in rabbit nematodes.” [Correspondence.] 175 (4448), 218-219.
 c. BROWN, E. B., 1955.—“Occurrence of the root-knot eelworm, *Meloidogyne hapla*, out of doors in Great Britain.” [Correspondence.] 175 (4453), 430-431.
 d. BASDEN, E. B. & GOODEY, J. B., 1955.—“A nematode parasite of *Drosophila*.” [Correspondence.] 175 (4453), 431-432.

(34a) Brown records an attack of *Aphelenchoides ritzema-bosi* on the annual aster *Callistephus chinensis*. Severe injury was observed to seedlings grown in sterilized compost.

When samples of the original seed and of associated plant debris were soaked in water large numbers of the nematodes were found in both cases, showing the infestation to have been seed-borne. This is the first record of *Aphelenchoides* being seed-borne.

M.T.F.

(34b) Recent work on the parasites of the wild rabbit in New Zealand provides the first picture of population size of *Trichostrongylus retortaeformis*. Marked differences occur between this picture and those for *Graphidium strigosum*, *Nematospiroides dubius* and *Passalurus ambiguus*. A striking feature was the great range in the size of the infestations, evident in every weight group except that of from 400 gm. to 599 gm. Results indicate that heavy infestations are acquired early in the life of the rabbit and that there is a mechanism preventing the animal acquiring heavier infestations as it grows older. The author suggests that the abundance of *T. retortaeformis* is governed by the resistance of the host which in turn may be modified by various environmental factors; thus the effect of the parasite in controlling the numbers of the host is secondary or additional to that of the environment. The abundance of the parasites is strongly correlated with age of host (*G. strigosum*) and locality of collection (*T. retortaeformis*). Records of parasite abundance are of little significance unless linked with these facts.

D.M.

(34c) Brown records the occurrence of root-knot disease caused by *Meloidogyne hapla* on several crops growing on light soil in the eastern counties of England. The galls produced were small and in most cases there was extensive root proliferation. Complete failures of carrots, mangolds, sugar-beet and kale have been recorded and severe damage to *Scabiosa caucasica*.

M.T.F.

(34d) This is a preliminary report of an eelworm, provisionally identified as *Aphelenchulus* sp., parasitizing three species of *Drosophila* in Scotland.

J.B.G.

35—New Zealand Journal of Agriculture.

- a. WHITTEN, L. K., 1955.—“Drenching to control worms in sheep.” 90 (1), 23.
- b. WHITTEN, L. K., 1955.—“Large roundworm of pigs.” 90 (3), 255.

(35a) The results of 60 controlled field trials to measure the body-weight response of young sheep to drenching with phenothiazine are discussed. Out of all the trials, involving some 5,000 animals, two gave a body-weight difference of more than 10 lb. between treated and untreated sheep, seven between 5 lb. and 10 lb., and the remaining 51 trials either gave insignificant results or less than 5 lb. body-weight difference. Where infection had developed to the stage of causing some mortality, the value of drenching in reducing the infection was sometimes marked. The results make it very difficult to make any definite recommendations for drenching sheep but the following points are made: mature sheep seldom require drenching with a possible exception in the case of an infection breaking out in lambing ewes; the drenching of unweaned lambs is of very doubtful value and drenching at weaning is not believed to be as important as has previously been considered. Even in severe outbreaks drenching more frequently than every three to four weeks is unnecessary. Drenching is only necessary between March and mid-June, marked anaemia giving warning of an early outbreak. It is best to concentrate treatment in the March-May period in New Zealand when an extra dose is more valuable than the one at weaning.

D.M.

(35b) A recent survey, restricted to porkers, made by meat inspectors in a number of centres in New Zealand showed that the incidence of *Ascaris* infection was only 0.1% in the North Island (where nearly 90% of the pig population of New Zealand is reared), while it was 10% in the South Island.

R.T.L.

36—Parasitology.

- a. SPRENT, J. F. A., 1955.—“On the invasion of the central nervous system by nematodes. I. The incidence and pathological significance of nematodes in the central nervous system.” **45** (1/2), 31-40.
- b. SPRENT, J. F. A., 1955.—“On the invasion of the central nervous system by nematodes. II. Invasion of the nervous system in ascariasis.” **45** (1/2), 41-55.
- c. WILLIAMS, H. E., 1955.—“Studies on the bovine filariid *Setaria cervi* (Rudolphi, 1819).” **45** (1/2), 56-62.
- d. MAHON, J., 1955.—“Contributions to the genus *Paradilepis* Hsü, 1935.” **45** (1/2), 63-78.
- e. CROFTON, H. D., 1955.—“Nematode parasite populations in sheep on lowland farms. II. Worm egg counts in lambs.” **45** (1/2), 99-115.
- f. CORBETT, M. P., 1955.—“Occurrence of two species of *Crepidostomum* in brown trout (*Salmo trutta* L.) from north-east Ireland, with special reference to *Crepidostomum metoecus* Braun 1900.” **45** (1/2), 186-188.
- g. ELIAKIM, M. & DAVIES, A. M., 1955.—“The complement-fixation test in bilharziasis. II. Preparation and preservation of antigens from *Schistosoma mansoni* worms extracted in Coca's solution.” **45** (1/2), 189-194.

(36a) Sprent reviews the available literature dealing with various nematodes which have been observed in the central nervous system in animals and man and discusses their significance. The direct pathological effects are mainly the result of trauma and vary with the route of entry, size and mobility of the parasite. They may be focal or diffuse and may include haemorrhage, degenerative changes, cellular infiltration and glial proliferation. Nervous symptoms associated with the presence of nematodes outside the central nervous system may be allergic in origin. The possibility that nematodes may transport viruses into the central nervous system is discussed.

R.T.L.

(36b) Sprent gives an account of his experiments and observations on the distribution, mode of entry, development and pathological significance of the larvae of various ascariid species in the central nervous system of mice, pigs and dogs. The larvae of *Toxocara canis*, *T. mystax*, *Ascaris devosi*, *A. columnaris* and *Toxascaris transfuga* reach the brain of mice via the arterial system and produce characteristic haemorrhages on the surface of the cerebral hemispheres. They leave the arteries on the surface of the brain and then penetrate into the brain from the subarachnoid space and chorioidal tissues. The larvae of *Toxocara canis* occur in the brain in relatively large numbers but do not grow and rarely cause nervous symptoms. They move actively through the tissues, leaving haemorrhagic tracks but incite little cellular reaction. They were also found in the brain of two out of 12 experimentally infected dogs but not in those naturally infected. The larvae of *Ascaris columnaris* attain a relatively large size about three weeks after infection causing nervous symptoms from traumatic damage and are often associated with a necrotic focus of leucocytes. No larvae were found in the brain of foals or mice experimentally infected with *Parascaris equorum* or in naturally infected foals. Larvae of *Ascaris suum* were recovered from the cerebrum of a pig suffering from posterior paralysis but not in one experimentally infected or in experimentally infected mice. No larvae were found in the brain of mice which had received larvae of *A. lumbricoides* or of *Toxascaris leonina*.

R.T.L.

(36c) Dissection of the thorax and abdomen of over 342 wild *Stomoxys calcitrans* and the heads of another 54 specimens caught in the vicinity of three Wisconsin cattle herds failed to reveal any developing larvae of *Setaria cervi*. It was found that abundant microfilariae could be kept readily available for transmission experiments by implanting live adult *S. cervi* into the peritoneal cavity of rabbits. Eleven out of 16 rabbits recovered from the operation. In the blood of one rabbit into which 30 females and six males had been introduced 432 microfilariae per c.c. were present eight days later. The longest period during which microfilariae were recovered after adults had been implanted was 45 days. The circulating microfilariae were sheathed and were as active in the rabbits' blood as in that of cattle. Details are given of the morphology of the adults and microfilariae of *S. cervi*. It is noted that in the female the anus opens dorsally in the caudal portion and the vulva ventrally near the anterior end.

R.T.L.

(36d) Mahon has critically examined the six known species of *Paradilepis* and lists the hosts and localities in which each has been reported. *P. scolecina*, with which *P. duboisi* is a synonym according to Baer, is type of the genus. Examination of co-types of *Dilepis minima* described by Goss in 1940 from *Phalacrocorax varius*, *P. ater*, *P. carbo* and *Haliëtor melanoleucus* in Australia shows that it also is a synonym of *P. scolecina*. *P. delachauxi* is redescribed. The testes are four in number not five as recorded by Joyeux & Baer in 1950. In *P. kempfi* there are four not three testes. Examination of co-types of *Dilepis maxima* Goss, 1940 shows that this is a synonym of *P. kempfi*. The type material of *P. macracantha* has been re-examined. The anatomy of the strobila is similar to that of *P. delachauxi*. *P. macracantha* and *P. simoni* have not been found since they were first described. Preparations of *P. urceus* from the Berlin and Vienna museums were found to be identical with *P. scolecina* but the two species are not considered to be synonymous. As *Hymenolepis multihamata* Meggitt, 1927 was considered by Joyeux & Baer to be a synonym of *P. urceus* new measurements for the co-type and those given by Meggitt are tabulated with those of Johri for *Oligorchis hieraticos*, which Joyeux & Baer considered to be another synonym of *P. urceus*. An addendum states that a description by Freeman of a new species *P. rugovaginosus* appeared while the present paper was in the press.

R.T.L.

(36e) Following on his observations on the nematode populations in ewes on lowland farms [for abstract see Helm. Abs., 23, No. 291 I] Crofton now deals with the lambs from the same three flocks. The most characteristic feature of the pattern of egg counts was an increase from a relatively low figure in spring to a high count in summer or early autumn. Thereafter there was a more or less rapid fall and in most cases the number of eggs in the winter counts was small. Movement from pasture to pasture can only be regarded as a control measure if made at intervals shorter than the time of development from egg to infective stage, i.e. less than seven days in summer and somewhat longer in cooler periods. As the prevention of infection also prevents the development of acquired immunity the introduction of heavily infected animals or the breakdown of the system of movement may result in outbreaks of disease in the susceptible animals. Anthelmintics reduce the rate of increase in infection and this is of importance in the production of fat lambs. But treated animals do not acquire as strong an immunity as untreated lambs. Repeated dosing may reduce the total worm burden but immunity may not be completely acquired. -

R.T.L.

(36f) *Crepidostomum metoecus* is recorded for the first time from *Salmo trutta* in Ireland. *C. farionis* was also present.

R.T.L.

(36g) The most potent antigen recovered from *Schistosoma mansoni* adults by extraction in Coca's solution was that obtained by extracting a worm suspension diluted 1:500 at 37°C. for one hour, with vigorous shaking at 10-minute intervals, followed by 23 hours at 28°C. A second extraction was highly active and a third extraction also contained antigen. Complement fixation tests were made on the sera of 25 patients with chronic bilharziasis and 25 controls. The most specific results were those obtained with either of the first two worm extracts suspended in 100 parts of Coca's solution and extracted for one hour at 37°C. and 23 hours at 28°C. or with the first extract suspended in 500 parts and similarly extracted. The antigen when kept in a refrigerator retained its titre for one month with or without the addition of 0.1% cysteine. If the extract was frozen or lyophilized the titre dropped rapidly. Extracts of lyophilized worms retained a constant titre for 3½ months followed by a slight drop after five to six months. When kept thoroughly desiccated in a refrigerator for four months worm powder retained its antigenic potency but if partial rehydration occurred this was lost in 40 days.

R.T.L.

37—Phytopathology.

- a. TAYLOR, A. L., DROPKIN, V. H. & MARTIN, G. C., 1955.—“Perineal patterns of root-knot nematodes.” **45** (1), 26–34.
- b. REYNOLDS, H. W., 1955.—“Varietal susceptibility of alfalfa to two species of root-knot nematodes.” **45** (2), 70–72.
- c. LOWNSBERY, B. F. & PETERS, B. G., 1955.—“The relation of the tobacco cyst nematode to tobacco growth.” **45** (3), 163–167.
- d. BRAUN, A. J., 1955.—“Evidence of damage to strawberry by ectoparasitic nematodes.” [Abstract of paper presented at the 10th Annual Meeting of the Northeastern Division of the American Phytopathological Society, West Springfield, Mass., November 4–5, 1954.] **45** (3), 183.
- e. CHEO, P. C. & TARJAN, A. C., 1955.—“Antifermentative chemicals for use in oatmeal cultures of *Panagrellus redivivus* (Nematoda).” [Abstract of paper presented at the 10th Annual Meeting of the Northeastern Division of the American Phytopathological Society, West Springfield, Mass., November 4–5, 1954.] **45** (3), 184.
- f. FERRIS, J. M. & MAI, W. F., 1955.—“The stimulation of larval emigration by root diffusates of several host and nonhost plants of the golden nematode, *Heterodera rostochiensis* Wollenweber.” [Abstract of paper presented at the 10th Annual Meeting of the Northeastern Division of the American Phytopathological Society, West Springfield, Mass., November 4–5, 1954.] **45** (3), 184.
- g. ANDERSON, E. J. & YANAGIHARA, I., 1955.—“A method for estimating numbers of motile nematodes in large numbers of soil samples.” **45** (4), 238–239.

(37a) The authors have studied the perineal patterns in the six species, one subspecies and one variety of *Meloidogyne* and give photomicrographs of a typical specimen and several variants of each. They describe the technique used for displaying the perineal patterns; they explain the features by which the species are characterized and give a key for their identification.

M.T.F.

(37b) Reynolds tested ten varieties of lucerne in pots in the green-house for their resistance to *Meloidogyne javanica* and *M. incognita* var. *acrita*. After four months' growth the relative root-knot indices were compared. Two selections of the variety African were resistant to both root-knot nematode species: the variety Narragansett was fairly resistant. Three Chilean varieties were susceptible to *M. javanica* but resistant to *M. incognita* var. *acrita*. Buffalo, Atlantic, Nemastan and Ranger were all susceptible to both nematode species. In a field infested with *M. incognita* var. *acrita*, a test of eight varieties of lucerne gave similar results. In the south-west of the U.S.A. where lucerne is rotated with cotton and *M. incognita* var. *acrita* is present, the cultivation of varieties of lucerne resistant to this nematode is of value in increasing the cotton yield and reducing root-knot damage.

M.T.F.

(37c) The preliminary “abstract of paper presented” [for abstract see Helm. Abs., **23**, No. 293d] showed that *Heterodera tabacum* can stunt tobacco plants. The full text brings out the further points that the data were handled by the orthogonal polynomial technique of Fisher & Yates, that there was a suggestion of plant stimulation at the lowest inoculation rate (these plants being slightly taller and heavier than uninoculated controls) and that height of plants can be a more sensitive criterion than weight, even if less meaningful economically.

B.G.P.

(37d) Many commercial plantings of strawberry in New York State have root lesions resembling the scars produced by ectoparasitic nematodes. In areas where these are less numerous or absent such symptoms are absent. In plots fumigated with Dowfume W-8 (1, 2-dibromoethane) at 4.5 and 9 gallons per acre before planting, the production of runner plants increased respectively by 4.8% and 27.3% and the increase in yields was 24% and 36.9%. Although the planting stock was not made nematode-free the fumigation is believed to have reduced substantially the population of nematodes injurious to the strawberry roots.

R.T.L.

(37e) When cultured in an oatmeal substrate *Panagrellus redivivus* is a suitable test organism for nematicides but its multiplication is often prevented by fermentative organisms. Fermentation of the substrate was checked, without apparently harming the nematodes, by

oxyquinoline benzoate at 10 to 50 p.p.m., iodoacetic acid at 5 to 10 p.p.m., zinc oxide at 250 to 500 p.p.m., sodium benzoate at 250 to 500 p.p.m. and superior to these was Amberlite IR-120 at 20,000 to 40,000 p.p.m. which had no ill effects in concentrations as high as 80,000 p.p.m. The susceptibility of nematodes from cultures treated with this granular cation exchange resin was indistinguishable from that of non-treated cultures. R.T.L.

(37f) The average hatch of *Heterodera rostochiensis* larvae from one gramme of cysts in 30 ml. of seedling root diffusate was 693 from *Solanum tuberosum*, 719 from *S. dulcamara*, 574 from *S. citrullifolium*, 294 from *S. xanthii* and 67 from maize. This indicates that diffusate potency is not necessarily correlated with susceptibility. R.T.L.

(37g) The authors describe a rapid, cheap and relatively accurate method for extracting active nematodes from large numbers of soil samples when relative estimates are required. The soil is placed in a piece of facial cleansing tissue supported on a sieve placed in the top of a conical paper cup which is waxed inside and filled with water so that the soil is submerged. After four days the pointed base of the paper cup is pierced by means of a long needle inserted from the top and 12 ml. to 15 ml. of water, which contains all the nematodes which have emerged from the soil, are drained off into a counting vessel. M.T.F.

38—Plant Disease Reporter.

- a. MARTIN, W. J. & BIRCHFIELD, W., 1955.—“Notes on plant parasitic nematodes in Louisiana.” **39** (1), 3-4.
- b. HOLDEMAN, Q. L., 1955.—“The present known distribution of the sting nematode, *Belonolaimus gracilis*, in the Coastal Plain of the southeastern United States.” **39** (1), 5-8.
- c. WINSTEAD, N. N., SKOTLAND, C. B. & SASSER, J. N., 1955.—“Soybean cyst nematode in North Carolina.” **39** (1), 9-11.
- d. BAZÁN DE SEGURA, C. & AGUILAR F., P., 1955.—“Nematodes and root rot diseases of Peruvian cotton.” **39** (1), 12.
- e. FELDMESSER, J. & SHAFER, T., 1955.—“Tests with two organic mercurials against the golden nematode of potatoes.” **39** (1), 13.
- f. ATKINS, J. G., FIELDING, M. J. & HOLLIS, J. P., 1955.—“A new nematode on rice in Texas and Louisiana.” **39** (1), 69.
- g. TARJAN, A. C. & HART, S. W., 1955.—“Occurrence of yellow tuft of bentgrass in Rhode Island.” **39** (2), 185.
- h. ATKINS, J. G., FIELDING, M. J. & HOLLIS, J. P., 1955.—“Parasitic or suspected plant parasitic nematodes found in rice soils from Texas and Louisiana.” **39** (3), 221-222.
- i. McBETH, C. W. & BERGESON, G. B., 1955.—“1,2-dibromo-3-chloropropane—a new nematocide.” **39** (3), 223-225.
- j. McCLELLAN, W. D., WILHELM, S. & GEORGE, A., 1955.—“Incidence of verticillium wilt in cotton not affected by root-knot nematodes.” **39** (3), 226-227.
- k. RICH, A. E., 1955.—“The occurrence and control of *Paratylenchus hamatus* on celery in New Hampshire.” **39** (4), 307-308.
- l. BROOKS, T. L., 1955.—“Additional hosts of the burrowing nematode in Florida.” **39** (4), 309.
- m. LORDELLO, L. G. E., 1955.—“Nematodes attacking soybean in Brazil.” **39** (4), 310-311.

(38a) Martin & Birchfield give a list of nematodes known or suspected to be plant parasites which have been found associated with crop plants in Louisiana since 1950. There are notes on the crops concerned, the distribution of the nematodes and the results of some host tests. In all 20 genera are included and 34 different occurrences. M.T.F.

(38b) Holdeman gives a preliminary account of the distribution of *Belonolaimus gracilis* in the south-eastern U.S.A. Its presence is confirmed in Virginia, North and South Carolina, Georgia, Florida and Louisiana, but not in Alabama and Mississippi, although suspected in these States. The counties in which it has been found and the crops affected are listed. M.T.F.

(38c) A species of *Heterodera* is reported attacking and seriously damaging soya beans (*Glycine max*) in south-eastern North Carolina. It is tentatively identified as *H. glycines*. There were several thousand cysts per pint of soil. M.T.F.

(38d) The presence of *Meloidogyne incognita* var. *acrita* in Peru has added to the root disease complex in cotton. Observations indicate that the nematode alone, if in high numbers, may cause the death of cotton plants, but equally serious effects may result if the roots are injured and are subsequently attacked by *Verticillium* or *Thielaviopsis*, or both. Resistant varieties of cotton may become susceptible after damage by nematodes. Selections from lines of Tanguis cotton resistant to nematodes are being developed. M.T.F.

(38e) The two most promising chemicals of 252 screened for use as dips to kill potato root eelworm cysts were the organic mercurials Aavanta and Aabulba, the latter being the more effective. Concentrations of 1.0%, 0.5% and 0.25% were effective and treatments for six hours with 0.125% or ten minutes with 2.0% were lethal. Phytotoxicity tests showed that treatments lethal to nematode cysts were toxic to *Convallaria* pips, *Kaempferia* and *Dahlia* but were tolerated by *Gladiolus*, *Amaryllis*, tuberoses and *Chrysanthemum*. Potted *Gardenia* withstood 1.0% drenches. [To which of the two substances the results apply is not stated.] M.T.F.

(38f) Atkins *et al.* reports the finding of *Radopholus oryzae* in samples of soil and rice roots from one place in Texas and seven in south-west Louisiana. This is the first record of this nematode occurring in the U.S.A. M.T.F.

(38g) It is suggested that the condition "yellow tuft" of bent-grass may be connected with the presence of species of *Panagrolaimus*, *Eucephalobus*, *Aphelenchoides*, *Aphelenchus* and *Rhabditis*. J.G.B.

(38h) The authors have extracted nematodes from 76 samples of soil and parts of rice plants from rice fields in Texas and Louisiana. Lists are given of the parasitic and suspected parasitic nematodes found, most of them being undescribed species. It is emphasized that there is no proof that any of the nematodes, except *Radopholus oryzae*, are pathogenic parasites of rice. Further work is being undertaken to determine whether certain of them are of any economic importance. M.T.F.

(38i) Green-house and field tests of 1,2-dibromo-3-chloropropane have shown it to be effective against *Meloidogyne incognita* var. *acrita* and *Heterodera schachtii* at dosages much lower than those necessary with D-D mixture or ethylene dibromide. It does not act as quickly as the latter chemicals but it is less phytotoxic. Established plants of citrus, peach, fig, walnut, grape and some ornamentals can be treated with several times the nematocidal dose without harm. Onion, tobacco, potato and other vegetables are very sensitive. M.T.F.

(38j) Fumigation with 85% ethylene dibromide at 4.5 gallons per acre effectively controlled *Meloidogyne incognita* var. *acrita* in a heavily infested field of Foster Fine Sandy Loam. Some treatments were made nine days before planting cotton, others immediately ahead of the planter. The cotton grew significantly better on treated than on untreated plots but yields of seed cotton showed no increase, possibly due to the cotton shedding its "squares" on account of excess nitrogen. Verticillium wilt was severe in all treatments and it is concluded that EDB at nematocidal dosages does not control verticillium wilt nor does the control of nematodes decrease the incidence of this wilt in cotton, in direct contrast to the situation with the fusarium wilt and root-knot complex. M.T.F.

(38k) *Paratylenchus hamatus* attacking the roots of celery caused severe stunting and chlorosis. Cropping with lettuce and spinach for two years apparently eradicated the eelworm. J.G.B.

(38l) Nine new hosts of *Radopholus similis*, found under field conditions are: *Desmodium* sp. (beggarweed), *Celosia nitida* Vahl (wild celosia), *Urena lobata* L. (Caesar's weed), *Solanum nigrum* L. (nightshade), *Rivina humilis* L. (bloodberry), *Solanum seaforthianum* Andr. (Brazilian nightshade), *Diospyros virginiana* L. (persimmon), *Pyrostegia venusta* Baill. (flame vine) and *Psidium guajava* L. (guava). J.G.B.

(38m) The soya bean variety La 41-1219 is attacked by *Meloidogyne incognita* but not by a closely related species, to be described as a new species elsewhere. La 41-1219 was not attacked by an undescribed subspecies of *M. javanica* although variety Abura was. Large galls on soya bean roots were produced by all three species. J.B.G.

39—Proceedings of the Helminthological Society of Washington.

- a. THORNE, G., 1955.—"Fifteen new species of the genus *Hemicyclophora* with an emended description of *H. typica* de Man (Tylenchida Criconematidae)." **22** (1), 1-16.
- b. LORDELLO, L. G. E., 1955.—"*Xiphinema krugi* n.sp. (Nematoda, Dorylaimidae) from Brazil with a key to the species of *Xiphinema*." **22** (1), 16-21.
- c. SANTMYER, P. H., 1955.—"A comparison of the thermal death time of two dissimilar species of nematodes: *Panagrellus redivivus* (Linn. 1767) Goodey 1945, and *Meloidogyne incognita* var. *acrita* Chitwood, 1949." **22** (1), 22-25.
- d. RAUSCH, R., 1955.—"*Cyclust[el]ra ardeae* n.sp. and the status of *Dendrouterina* Fuhrmann, 1912 (Cestoda: Dilepididae)." **22** (1), 25-29.
- e. LORDELLO, L. G. E., 1955.—"*Discolaimus auritus* n.sp. found inhabiting forest soil in Brazil (Nematoda, Dorylaimidae)." **22** (1), 29-31.
- f. CAIRNS, E. J. & TARJAN, A. C., 1955.—"Methylcellulose for the rapid preparation of temporary nematode head-mounts." **22** (1), 32.
- g. TARJAN, A. C., 1955.—"Evaluation of various nematodes for use in contact nematocide tests." **22** (1), 33-37.
- h. PRICE, D. L., 1955.—"*Dipetalonema procyonis* n.sp. from *Procyon lotor lotor* (Linnaeus)." **22** (1), 38-41.
- i. SCHILLER, E. L., 1955.—"Some cestode parasites of the old-squaw, *Glangula hyemalis* (L.)." **22** (1), 41.
- j. DIKMANS, G. & KATES, K. C., 1955.—"Trichostrongylosis in cattle." **22** (1), 42-46.
- k. FISCHTHAL, J. H., 1955.—"Helminths of salamanders from Promised Land State Forest Park, Pennsylvania." **22** (1), 46-48.
- l. MOUNTAIN, W. B., 1955.—"A method of culturing plant parasitic nematodes under sterile conditions." **22** (1), 49-52.
- m. SEGHETTI, L., 1955.—"A method for mass recovery and hatching of *Nematodirus* eggs." **22** (1), 53-55.

(39a) Thorne records finding a hemizonid in both male and female specimens of *Hemicyclophora typica* and *H. penetrans* n.sp. and emends the original description of *H. typica*. Having failed to find it in 12 monosexual species, he is of the opinion that this structure may possibly be associated with the sexual processes. Fifteen new species of *Hemicyclophora* are described and figured. (i) *H. gigas* n.sp., female 1.9 mm. long, has ovate shadowy markings of the cuticle of the lateral fields and was collected in North Carolina. (ii) *H. tenuis* n.sp., a single female 1.4 mm. long, from Little Cottonwood Canyon, Utah, is distinguished by its slenderness and by a uniformly conoid tail ending in a small rounded point. (iii) *H. penetrans* n.sp., female 1.0 mm. long and male 0.8 mm. long, abundant in rice and corn plantings at Bogor, Java, has longitudinal lines on the cuticle, the oesophagus has a very slight clavate base and a long tube leads from the vulva through the unshed larval cuticle. The male has a spicule reflexed to an unusual degree. (iv) *H. arcuata* n.sp., female 0.65 mm. long, has a slender slightly arcuate body, narrow lip region and tapers uniformly posteriorly. *H. arcuata* occurred in soil around roots of plants imported from Brazil. (v) *H. conida* n.sp., female 0.8 mm. long, the posterior end of the body is conoid, two lines mark the lateral field; each annule adjacent to the lateral field has a pair of shadowy ovate bodies. *H. conida* was found in three sugar-beet fields in Ireland. (vi) *H. uniformis* n.sp., female 0.9 mm. long, differs from *H. parvana* and *H. conida* in its narrowed, conoid lip region and in the spear length which is about one-half as long as that of the vulva-terminus distance. *H. uniformis* was collected from soil in Rockcliffe Park, Ottawa. (vii) *H. gracilis* n.sp., female 1.3 mm. to 1.7 mm. long, has two lines on the lateral field, the lip region is rounded and the end of the tail is convex-conoid. This species was found in Virginia, Michigan, New Jersey, North Carolina and Oregon. (viii) *H. similis* n.sp., female 1.1 mm. long, from a field of lucerne in Nevada, a peach orchard in California and rose-beds near Denver, Colorado, is practically identical with the female of *H. typica* but is monosexual and has no spermatheca. *H. similis* was also collected in Utah

and Quebec. (ix) *H. brevis* n.sp., a single female 1 mm. long, was found at Inverness, California. The vulva-terminus distance is shorter than the spear length. The excretory pore is about opposite the base of the median oesophageal bulb. (x) *H. obesa* n.sp., female 1.1 mm. long, is distinguished by the greater breadth of the body and the form of the tail. There is a well developed spermatheca but no spermatozoa were present. Obscure hemizonoids were seen in a few of the specimens. This species was collected from soil around alpine plants at Brighton, Utah. (xi) *H. aberrans* n.sp., female 1 mm. long, has a tightly stretched larval cuticle, irregularly-conoid tail, the vulva has a protuberant lip, and there is a prominent ventral contraction of the body at the vulva. Three specimens were collected from stream bank soil at Little Cottonwood Canyon, Utah. (xii) *H. striatula* n.sp., based on a female 0.8 mm. long, differs from *H. aberrans* in its shorter spear length, truncated head and in having 56 annules in the vulva-anus region. This was collected from soil around roots of *Arctostaphylos* sp. in California. (xiii) *H. obtusa* n.sp., based on a female 0.8 mm., differs from other round-tailed species in having a rounded lip region with two annules, a closely clinging larval cuticle which is smooth over the tail and a ventral contraction of the body at the vulva. *H. obtusa* was found around the roots of sugar-beet near Lewiston, Utah. (xiv) *H. nana* n.sp., based on a female 0.7 mm. long, has a cylindrical body, the two last larval cuticles are retained and the body has no ventral contraction at the vulva. This species was collected at 8,500 ft. from soil around alpine plants, Red Mountain, Utah. (xv) *H. rotundicauda* n.sp., based on a female 1.2 mm. long, is larger than *H. obtusa* from which it differs also in that the rounded lip region bears two broad annules. It was collected from soil around a conifer at Echo Lake, Colorado. Thorne considers *H. membranifer* to be a valid species and not a synonym of *H. typica*. A key is provided for the differentiation of the females of 21 species of *Hemicycliophora* [including the 15 new species cited above].

R.T.L.

(39b) Females and larvae of *Xiphinema krugi* n.sp. were collected from soil around native forest trees in São Paulo. The species now described and figured resembles *X. ensiculiferum* but the tail is subconoid, not rounded, and there are two ovaries instead of one. A key is given for the separation of the females of the species of *Xiphinema* known to date excluding the larval forms *X. brevicaudatum*, *X. effilatum* and *X. digiticaudatum*.

R.T.L.

(39c) In a test of the "all or nothing" response to heat of the most resistant forms, the saprophytic *Panagrellus redivivus*, at all stages of development in petri dish cultures, showed greater heat resistance than did the egg masses of *Meloidogyne incognita* var. *acrita*, containing eggs and larvae at all intermediate stages. This difference in thermal death time may, from the standpoint of enzyme inactivation, represent greater physiological differences than has been assumed hitherto.

R.T.L.

(39d) *Cycluster ardeae* n.sp., from *Ardea herodias* collected in Wisconsin, differs from *C. capito* in having unilateral genital pores, 40 to 65 testes only per segment and a transverse arched uterus; the uterus in *C. capito* and in *C. fuhrmanni* forms a complete ring. The large hooks measure about 43 μ and the small hooks about 33 μ in length. *Dendrouterina* Fuhrmann, 1912 is considered to be a synonym of *Cycluster* Fuhrmann, 1901. Emended *Cycluster* now contains five species, viz., *C. capito* (Rudolphi, 1819), *C. fuhrmanni* (Clerc, 1906), *C. herodiae* (Fuhrmann, 1912) n.comb., *C. botaui* (Rausch, 1948) n.comb. and *C. ardeae* n.sp.

R.T.L.

(39e) *Discolaimus auritus* n.sp., found in soil from around the roots of forest trees at Piracicaba in the State of São Paulo, closely resembles *D. texanus* Cobb, 1913 but differs in the ventrally and dorsally convex and more pointed posterior end of the body, the less prominent lips, the smaller amphids and the greater width of the female.

R.T.L.

(39f) Methylcellulose provides a satisfactory, although temporary, viscous clear mounting medium for the study of *en face* preparations of nematodes. Solid methylcellulose of a high viscosity (e.g. 400-4,000 cps.) is immersed in 50 ml. of distilled water at 80°C. to 90°C. and after 30 minutes is cooled by immersing the container in cold water. The specimen is transferred into a drop of the medium on a glass slide, its head is severed, and a coverslip

is placed on the drop and manipulated to bring the head into the desired position. Molten paraffin-petroleum jelly mixture is applied to the edges of the coverslip to keep it firmly in place for microscopical examination.

R.T.L.

(39g) As certain members of the Triton group of surface active agents were unexpectedly found to be nematocidal at 1,000 p.p.m. in aqueous solution, investigations were made on the relative value of several nematode species for contact nematocide testing. Solutions or suspensions containing 1,000 p.p.m. of Triton X-45, Triton X-100, Triton X-188, Phillips Nematocidal Mixture PN, and a dihydroxybenzene were tested on *Panagrellus redivivus*, *Diplogaster* sp., *Pungentus pungens*, *Xiphinema americanum*, *Meloidogyne incognita*, *Dolichodorus heterocephalus*, *Ditylenchus* sp. and *Rotylenchus erythrinae*. *P. redivivus* was tentatively selected as the most suitable screening test organism owing to its large size, ease of culture, short life-cycle, active habit and the regularity of its response to different chemical concentrations within designated time limits.

R.T.L.

(39h) *Dipetalonema procyonis* n.sp., from the subcutaneous tissues of a raccoon *Procyon lotor lotor* trapped at Laurel, Maryland, differs from *D. dasyuri* in the number and arrangement of the cephalic papillae (in *D. procyonis* there are eight in the outer circle and two small internolaterals in the inner circle), in having four lobes at the posterior end of the body, in the position of the vulva 1.1 mm. from the anterior end, and in the number and arrangement of the male papillae of which four pairs are anterior and three pairs posterior to the anogenital opening.

R.T.L.

(39i) *Clangula hyemalis* in Alaska is a new host for *Lateriporus teres*, *Hymenolepis jägerskiöldi* and *Fimbriarioides intermedia* although the occurrence of these cestodes has been recorded previously for North America.

R.T.L.

(39j) The reported occurrences of *Trichostrongylus colubriformis* and *T. axei* in cattle are few and none have hitherto dealt with their effects. Losses in a herd of calves brought to Northern Virginia from Texas were found to be due to intestinal nematodes of which these were the predominant species and produced symptoms similar to those in sheep and goats.

R.T.L.

(39k) Fischthal lists seven helminth species recovered from salamanders and newts from a forest area in the Pocono Mountains of north-eastern Pennsylvania. Three were trematodes and four were nematodes. All of them probably represent new distribution records.

R.T.L.

(39l) To obtain proof that a suspected nematode is pathogenic to plants, the organism should be cultivated as a pure line kept free from fungal and bacterial contaminants. This paper reports success in culturing *Pratylenchus minyus* for over four months using root tissue cultures under aseptic conditions in petri dishes. An undescribed species of *Pratylenchus* from roots of red clover was also cultured by this method for a shorter time. White's culture medium was made up into a 0.75% agar medium using well shredded agar, autoclaved and poured into sterile petri dishes. Maize, tobacco and red clover seeds, which had been surface-sterilized in commercial hypochlorite diluted to give an average chlorine concentration of 1%, were placed on moist sterile filter paper in sterile petri dishes and after germination the root tips were cut off by sterile scissors, were transferred to the nutrient agar in petri dishes and inoculated with the nematodes. Mature female *P. minyus* from washed maize roots were successively transferred to two sterile water baths and then singly to a 0.1% streptomycin sulphate solution for at least 15 minutes. After a further sterile water bath the worms were transferred by a fine sterile pipette to the petri dish containing the root culture. The nematodes immediately attacked the roots. Successful inoculations occurred in about 30% of the cultures.

R.T.L.

(39m) A method for concentrating the ova and subsequently hatching the larvae of *Nematodirus spathiger* from large quantities of sheep faeces in a minimum period of time consists of breaking up about 250 gm. of faeces in 750 ml. of water by an electric blender. The suspension is passed a little at a time through an eight-inch 25 or 40 mesh U.S. standard sieve into a container. The sieve is washed briefly with a stream of tap-water and is then transferred to a vessel containing four to six litres of water in which it is rocked for five to ten minutes. This procedure is repeated in a third container. The filtrates in the three containers are combined and agitated, then siphoned through an eight-inch U.S. standard sieve of 100 mesh. The sieve is transferred to and rocked in a vessel containing several litres of tap-water. The material on the sieve is washed briefly with tap-water. The filtrate is then siphoned through a U.S. standard sieve of 200 mesh. The material on the sieve is gently washed, the sieve is inverted over a large circular dish and washed with sufficient water to remove the sediment which now contains most of the large ova of *Nematodirus*. The smaller ova of other trichostrongylids had already passed through the 200 mesh sieve. The ova can be hatched in eight to ten days at 30°C. in a constant temperature water-bath equipped with a continuous stirrer. If after hatching is completed the contents of the water-bath are put into tall containers and kept for 24 hours at 4°C. the supernatant fluid can be separated off leaving the larvae in the bottom 5 cm.

R.T.L.

40—Proceedings of the Indian Academy of Sciences. Section B.

- a. SUBHAPRADHA, C. K., 1955.—“Two new bothriocephalids from the marine fish *Saurida tumbil* (Bloch).” **41** (1), 20-30.
- b. JAIN, S. L., 1955.—“Monogenea of Indian fresh-water fishes. III. *Urocleidus notopterus* n.sp. (subfamily Tetraonchinae), from the gills of *Notopterus notopterus* (Pallas), from Lucknow.” **41** (1), 31-37.
- c. JOHRI, G. N., 1955.—“On a new cestode, *Oochoristica hemidactyli* from the common wall lizard, *Hemidactylus flaviviridis* Ruppell.” **41** (2), 79-81.
- d. JOHRI, G. N., 1955.—“On a new cestode from the Indian cobra, *Naia naia* Linn.” **41** (2), 82-85.

(40a) *Bothriocephalus penetratus* n.sp. in the teleostean fish *Saurida tumbil* from the Madras coast can be distinguished by (i) its bell-shaped segments with prominent lateral expansions, (ii) the median uterine pores which are arranged in a straight line and (iii) the peculiar mode of attachment; the head and neck pass through the wall of the caecum and along the mesentery to become lodged inside the liver. The head is reduced to a thin, long immobile filament coiled inside a thick sheath which encloses that part of the worm lying outside the intestine. *Oncodiscus fimbriatus* n.sp., also from *Saurida tumbil*, resembles *O. sauridae* Yamaguti but its margins are highly folded. There is no median longitudinal furrow in the lateral face of the bothria, the testes are fewer, numbering up to 50 only; the uterine pore is at the anterior end of the proglottis and the eggs are not operculated.

R.T.L.

(40b) *Urocleidus notopterus* n.sp. from the gills of *Notopterus notopterus* at Lucknow differs from the 37 known and valid species by the presence of an enormous egg with a knob-like projection, the highly chitinated dextral vagina, the coiled, thick-walled cirrus with a prong-like accessory piece and the presence of supporting bars in the haptor.

R.T.L.

(40c) *Oochoristica hemidactyli* n.sp., from the common wall lizard (*Hemidactylus flaviviridis*) at Benares and Lucknow, is only 49 mm. long. This, with its smaller scolex and suckers, distinguishes it from *O. pennsylvanica*, *O. khalili*, *O. rostellata* and *O. tuberculata*. The arrangement of the testes in two distinct lateral groups differentiates it from all these except *O. pennsylvanica* from which, however, it differs in its larger cirrus sac, extending up to the ventral longitudinal excretory canal. Unlike *O. rostellata* it has no receptaculum seminis. The eggs are much smaller than those of *O. khalili*.

R.T.L.

(40d) *Ophiotaenia indica* n.sp. from *Naja naja* at Benares and Lucknow closely resembles *O. saphena* and *O. nankingsensis* but the testes number only 30 to 32, of which about half are on the poral side. There is no fifth sucker. The cirrus is much larger, in relation to its smaller body size, than in *O. saphena*. There are only 15 to 17 uterine branches which distinguishes it from *O. nankingsensis*.

R.T.L.

41—Revista Ibérica de Parasitología.

- a. GONZÁLEZ CASTRO, J., FERNÁNDEZ AMELA, T. & GUEVARA POZO, D., 1955.—“Primeros ensayos en España de la prueba de Suessenguth y Kline para el diagnóstico de la triquinosis.” 15 (1), 3–31. [English summary pp. 28–29.]
- b. LÓPEZ-NEYRA, C. R., 1955.—“Anoplocephalidae. (Continuación.)” 15 (1), 33–84. [English summary pp. 60–62.]
- c. FLORES-BARROETA, L., 1955.—“Céstodos de vertebrados. II.” 15 (2), 115–134. [English summary p. 133.]

(41a) The Suessenguth & Kline test gave 22 positives out of 102 sera received at the laboratory. This (21.56%) probably represents the actual frequency of trichinella infection among the population of Granada. Sera of 18 mice, three rabbits, seven pigs, nine guinea-pigs and six persons, some with *Ascaris* infection but all without a history of trichinosis, gave a negative flocculation test. Nevertheless one pig seemingly free of trichinella but with a 17-day infection of *Ascaris suum* gave a positive test. Two pigs and three persons naturally infected with trichinella all gave positive Suessenguth & Kline tests.

M.MCK.

(41b) In this, the last section of his memoir on the Anoplocephalidae, López-Neyra discusses the subfamily Idiogeninae as emended by him and recognizes the genera *Idiogenes*, *Chapmania* (= *Ascometra*), *Schistometra*, *Sphyrnchotaenia*, *Ascotaenia*, *Avitellina*, *Thysanosoma*, *Wyominia*, *Stilesia* and *Thysaniezia*. He considers *Inermicapsifer otidis* Meggitt, 1927 synonymous with *Chapmania tapika* (Clerc, 1906) Fuhrmann, 1908 and suggests that *Chapmania* is probably synonymous with *Schistometra*, and *Wyominia* with *Thysanosoma*. He gives comparative tables of species for *Chapmania*, *Idiogenes* and *Schistometra* and a key to the species of *Avitellina*. The article concludes with a summary of his revision of the Anoplocephalidae.

M.MCK.

(41c) Flores-Barroeta continues his account of the cestodes of vertebrates and describes tapeworms collected from birds captured at Chiconautla and Barra de Casitas in Mexico and from an iguana at Iguala Guerrero. Of the five species described and figured *Paratetrabothrius orientalis*, *Tatria decacantha* and *Diploposthe laevis* are reported from Mexico for the first time. The author agrees with López-Neyra that *T. decacantha* and, possibly, *D. laevis* are teratological specimens of the Hymenolepididae and suggests that other genera of the Diploposthidae should be re-examined in order to establish whether they are valid.

R.T.L.

42—Rivista di Parassitologia.

- a. RICCI, M., 1955.—“Sulla diagnosi della ossiurosi con il metodo di Graham.” 16 (1), 59–60.

(42a) After a single examination (by the Graham method) of 337 children between the ages of six and twelve years in the province of Latina, Italy, 73.89% were found to be infected with *Enterobius*. A second examination of the negative and doubtful cases revealed another 1.78% and a third examination yielded a further 2.97%, giving a final total rate of 78.64% positive.

M.MCK.

43—Science. Lancaster, Pa.

- a. BIRD, A. F., 1955.—“Importance of proteases as factors involved in the exsheathing mechanism of infective nematode larvae of sheep.” 121 (3134), 107.

(43a) Bird reviews recent work by himself and others on the effect of enzymes on the sheaths of infective trichostrongylid larvae. As Bird has shown that the cuticle of the infective larvae of *Haemonchus contortus* lacks the aromatic amino-acids lysine and arginine, the failure

of the proteases to attack the larval cuticle can be attributed to the chemical composition of the constituent proteins. More rapid exsheathing rates were obtained in distilled water at higher temperatures than in solutions of pepsin similar to those used by Crofton in his investigations on the larvae of *Trichostrongylus retortaeformis*.
R.T.L.

44—Scottish Agriculture.

- a. ROBERTSON, D., 1955.—“Stem eelworm of oats.” **34** (4), 209–212.
- b. STAMP, J. T., DUNN, A. M. & WATT, J. A. A., 1955.—“Lamb losses from worms—*Nematodirus* infestation.” **34** (4), 213–215.

(44a) Robertson gives an account of tulip root disease of oats due to *Ditylenchus dipsaci*, describing the symptoms and the life-cycle of the parasite. He lists the weed hosts of the oat race of the eelworm and emphasizes the importance of self-set oats in enabling the parasite to carry over from one oat crop to the next. None of the other crops commonly grown in the north of Scotland is attacked, so control should be possible by means of crop rotation omitting oats for four to six years. If oats must be grown, the resistant variety Milford (S.225) is recommended.
M.T.F.

(44b) *Nematodirus battus* and *N. filicollis* infections cause considerable lamb losses in the Border area of Scotland and are characterized by their sudden appearance and disappearance from late May to June. The symptoms appear simultaneously in a number of lambs. Because only young sheep appear to carry *Nematodirus* infection and the eggs develop slowly and only under the normal climatic conditions of late May the usual control methods are ineffective. There is no effective anthelmintic which can be given to infected stock. The obvious preventive measure is to avoid grazing lambs on the same pastures in consecutive years. This and other control measures are discussed and the suggestion is made that small doses of phenothiazine incorporated with the concentrates fed to lambs may reduce contamination of the pastures in the following year but this awaits verification.
D.M.

45—Southern Medical Journal.

- a. YOUNG, M. M., 1955.—“Report of a survey for intestinal parasites in school children in a rural mountain county in Tennessee.” **48** (1), 46–53.

(45a) Of 3,138 faecal samples from schoolchildren in Cumberland County, a mountain area of Tennessee, 19.6% carried hookworm. A much smaller incidence of parasitism was found among high school pupils than elementary schoolchildren. All the cases of hookworm were treated with tetrachlorethylene (dosage according to age and size) and 95 of 188 samples returned for re-examination were negative.
M.MCK.

46—Transactions of the American Microscopical Society.

- a. ROWAN, W. B., 1955.—“The life cycle and epizootiology of the rabbit trematode, *Hasstilesia tricolor* (Stiles and Hassall, 1894) Hall, 1916 (Trematoda: Brachylaemidae).” **74** (1), 1–21.
- b. SCHELL, S. C. & THOMAS, L. J., 1955.—“Parasite-host relationships in a brackish water lake.” **74** (1), 21–27.
- c. WOODHEAD, A. E., 1955.—“The germ cell cycle in the trematode family Brachylaemidae.” **74** (1), 28–33.
- d. WOODHEAD, A. E., 1955.—“A study of the miracidium of *Gigantobilharzia huronensis* Najim, 1950, with special reference to the germinal cells.” **74** (1), 33–37.
- e. SAUNDERS, D. C., 1955.—“The classification of microfilariae in birds. *Avifilaris tyrannidarum* and *A. fringillidarum*, two new species.” **74** (1), 37–45.
- f. WEBSTER, J. D., 1955.—“Three new forms of *Aploparaksis* (Cestoda: Hymenolepididae).” **74** (1), 45–51.
- g. JASKOSKI, B. J., 1955.—“Some ethomid effects on development of *Ascaris suum*. ” **74** (1), 51–54.

(46a) Rowan has completed experimentally the life-cycle of *Hasstilesia tricolor* in laboratory-bred *Vertigo ventricosa* form *elator* and in domestic rabbits. He amplifies the original

descriptions of the adults and describes the developmental stages in the snails. The miracidia hatch in the snail's intestine, penetrate the wall and become established in or against the digestive gland where they develop into sporocysts with a number of primary branches. Cercariae and metacercariae develop within the sporocysts, the whole development within the snail taking about ten weeks. The eggs, snails and developmental stages are resistant to low temperatures and to alternate freezing and thawing. Naturally infected snails can be found throughout the year but are more abundant in the autumn and winter and the incidence in cotton-tails is also highest at this time of year. In domestic rabbits mature flukes developed three weeks after infection with metacercariae. S.W.

(46b) In an investigation of the fauna of a brackish-water lake in Bermuda three new cercariae were found and are described and figured. All occurred in the snail *Batillaria minima* and encysted in the minnow *Fundulus bermudae* which was the only fish present. *Cercaria digitalis* n.sp. resembles the trichocercous cercariae in body form but has finger-like appendages instead of fine spines on the tail. *C. prehensa* n.sp., a rather sluggish cercaria, is distinguished by the brownish-orange colour of the tail and body and by the form of the tail which is longer than the body, prehensile and continually coiling and twisting. *C. minima* n.sp. lacks a ventral sucker and belongs to the *spelotrema* group; it was found in only one snail. *C. bermudensis* n.sp. occurred in about 3% of the snails and belongs to the *pleurolophocerca* group; it most closely resembles *C. coronanda*. Cysticerci with four unarmed suckers on the scolex, and a retractable rostellum with two rows of eight hooks occurred in about 5% of the minnows. S.W.

(46c) From a study of whole mounts and sections of brachylaemid sporocysts which he obtained from a single snail, Woodhead concludes that reproduction in the Brachylaemidae is sexual in all generations. He describes and illustrates the different functional branches of the sporocyst, the oocytes, fertilized ova, stages in maturation divisions, spermatogonia, spermatocytes, spermatids and tailless sperms which he observed in the sporocysts. S.W.

(46d) Woodhead has studied the morphology of the miracidium of *Gigantobilharzia huronensis*, basing his observations on 19 whole mounts fixed in Carnoy's solution and stained with Mallory's triple stain or Delafield's haematoxylin and eosin. He disagrees with some of Najim's observations made on living specimens and describes male and female germ cells. The male cells are enclosed in short or elongated packets or cords, the number at the time of hatching varying from four to eight. The female cells are located at the posterior end of the miracidium and are each attached by a stalk to the body wall; the number present varied from three to eight. S.W.

(46e) Saunders lists the water-fowl and other birds from Mexico in which she found microfilariae in the heart blood: many of these are new host records and descriptions will follow in later papers. She proposes the name *Avifilaris* n.g. for all avian microfilariae and describes two new species, *A. fringillidarum* n.sp. from *Rhodothraupis celaeno* and *Passerina cyanea*, and *A. tyrannidarum* n.sp. from *Pitangus sulphuratus* and *Empidonax minimus*; a number of relative measurements are given for each and a statistical analysis made of their variance. Neither of these two microfilariae is sheathed. S.W.

(46f) Webster describes and figures two new species and one new subspecies of *Aploparaksis*. *A. schilleri* n.sp. from *Erolia alpina pacifica* resembles *A. xemae* most closely but can be distinguished by the possession of larger and slightly differently shaped hooks, a longer cirrus pouch and a differently shaped cirrus lacking the distal slender part: *A. tandani* and *A. cirrosa* resemble *A. schilleri* but are both much larger. *A. rauschi* n.sp. from the same host is very similar to *A. scolopacis* but differs in the shape of the hooks and is one-tenth the size; in addition the scolex and rostellum are smaller, the testis is larger and the external seminal vesicle is lateral in position. *A. dujardinii neoarcticus* n.subsp. from *Ixoreus naevius naevius* differs from *A. d. dujardinii* in that it is smaller in size, the cirrus pouch is smaller and the rostellar hooks are slightly longer. S.W.

(46g) Using de-coated and normal eggs of pig *Ascaris*, Jaskoski has tested the action on them of a series of six ethomids (non-ionic ethylene oxide concentration products of amides). None was lethal before cleavage began. Compounds lower in the series inhibited cleavage more than did those higher in the series, except one of the latter which retarded cleavage of both normal and de-coated eggs. When incubated at 38°C. for periods up to 24 hours there was no lethal effect on normal eggs although motile embryo formation was prevented. There appeared to be no direct correlation between the degree of reduction of the surface tension and the inhibitory effect. S.W.

47—Transactions of the Royal Society of Tropical Medicine and Hygiene.

- a. ADAMS, A. R. D. & SEATON, D. R., 1955.—“Photographs of and specimens from clinical cases.” [Demonstration.] 49 (1), 4–5.
- b. GORDON, R. M. & WEBBER, W. A. F., 1955.—“A new technique for the concentration of microfilariae.” [Demonstration.] 49 (1), 5.
- c. LAVOPIERRE, M. M. J., GORDON, R. M. & CREWE, W., 1955.—“The routes of migration of *Loa loa* in *Chrysops silacea* and the histology of the lesions produced.” [Demonstration.] 49 (1), 6.
- d. KERSHAW, W. E., DUKE, B. O. L., MOORE, P. J. & SCOTT-SMITH, A., 1955.—“An attempt to distinguish the contribution made from human and monkey sources to the infections with *Loa loa* found in wild *Chrysops* spp. in the rain-forest and in rubber estates; and to determine the possibility of using banocide in the control of the infection.” [Demonstration.] 49 (1), 6.
- e. KERSHAW, W. E., DUKE, B. O. L. & BUDDEN, F. H., 1955.—“Alternative mechanisms by which the microfilariae of *Onchocerca volvulus* may reach the eye and produce lesions of the anterior segment.” [Demonstration.] 49 (1), 7.

(47a) Adams & Seaton demonstrated photographs of a case of loaiasis and a case of multiple filarial infection in Europeans in West Africa in which treatment with banocide alleviated the symptoms, of an adult *Taenia saginata* recovered from a patient following treatment with mepacrine, and colour transparencies and specimens of hydatid cysts. S.W.

(47b) [This technique is described in detail in *Ann. trop. Med. Parasit.* For abstract see No. 8d above.]

(47c) In *Chrysops silacea*, migrating larvae of *Loa loa* were demonstrated lying in the ventral haemocoelic canal, sub-ciborial space and at the junction of the labio-hypopharyngeal membrane where, in the authors' opinion, the infective larvae escape from the fly during feeding. Some damage is done to the fat body, indirect flight muscles and retina by migrating larvae. R.T.L.

(47d) So far it has proved impossible to distinguish between the adults of *Loa* obtained from man and from monkeys and between the infective stage derived from these hosts in *Chrysops*. Preliminary results suggest that near a village flies acquire the greater part of their infection from human sources while in the rain-forest their infection is derived from monkeys or from casual human migrants. Removal of the human reservoir from the peripheral parts of a rubber estate where monkeys were rarely seen greatly reduced the infection in *Chrysops*. R.T.L.

(47e) In early or light *Onchocerca* infections, the microfilariae may be found only in the neighbourhood of the nodule. In those of moderate intensity, their distribution is largely independent of the position of the nodules although there may be a local increase around a single nodule. With increasing intensity of infection, the microfilarial concentration in the legs and trunks progressively spreads to the shoulders, face, conjunctiva, and anterior chamber of the eye which is invaded as a result of a rise in the level of microfilarial intensity in the head and neck resulting from prolonged exposure to infection or from a local increase coming from a nodule near the eye. R.T.L.

47—Transactions of the Royal Society of Tropical Medicine and Hygiene (cont.)

- f. KERSHAW, W. E., JAMISON, D. G., DUKE, B. O. L. & FEJER, E. A., 1955.—“The relation between the distribution of the microfilariae of *Onchocerca volvulus* in the skin and the histology of the lesions produced.” [Demonstration.] **49** (1), 7.
- g. NICHOLAS, W. L. & KERSHAW, W. E., 1955.—“The distribution of different species of *Culicoides* in Africa compared with that of the infection with *Acanthocheilonema perstans*.” [Demonstration.] **49** (1), 8.
- h. SILVERMAN, P. H. & GRIFFITHS, R. B., 1955.—“The epizootiology of bovine cysticercosis in cattle in Great Britain.” [Demonstration.] **49** (1), 8.
- i. KELLAS, L. M. & WEBBER, W. A. F., 1955.—“Filarial worms collected from Sudanese game animals.” [Demonstration.] **49** (1), 9.
- j. SANDARS, D. F., 1955.—“The life cycle of the rat lungworm, *Angiostrongylus cantonensis* (Chen) (worked out by M. J. Mackerras and D. F. Sandars).” [Demonstration.] **49** (1), 11.
- k. HOPKINS, C. A., 1955.—“The correlation between rate of oxygen uptake and the stage of development of *Parascaris equorum* eggs.” [Demonstration.] **49** (1), 12.

(47f) In onchocercal infections, the skin shows a gradual thickening of the epidermis, a progressive reduction of the sub-epidermal elastica and a blunting and reduction of the papillae. Few microfilariae remain in the skin when it is severely affected by fibrosis, atrophy, scarring or leucoderma etc. The microfilariae in cases of moderate intensity are more numerous in the ankles, calves and buttocks than in the thighs and waist and are few or absent in the shoulders or face. The microfilarial concentration is proportional to the degree of lichenification and is greater on the dorsal and extensor surfaces of the body. In advanced cases the skin of the ankles and calves becomes fibrosed. R.T.L.

(47g) Re-examination of the type specimen of *Culicoides austeni* Carter, Ingram & Macfie, 1920, vector of *Acanthocheilonema perstans*, reveals that the grounds on which it was separated from *C. milnei* Austen, 1912 are not valid. The latter name has priority in zoological nomenclature. The recorded distribution of *C. austeni* is wider than that of *A. perstans* and that of *C. grahami*, a doubtful vector, is less. R.T.L.

(47h) The incidence during 1952 and 1953 of *Cysticercus bovis* detected at 41 abattoirs in England ranged from 1.03% to 3.47%. This is thought to be more representative than the national average of 0.33% published for the same period. As tapeworm eggs kept under conditions of high relative humidity remained viable for almost a year, it seems probable that sludge used as fertilizer may prove a source of infection for cattle. The authors have demonstrated that sea-gulls eat raw sewage and are able to deposit the eggs in a viable state after ingestion. R.T.L.

(47i) *Dirofilaria repens* was recovered from the connective tissue of two lions and an unnamed species of *Dipetalonema*, with microfilariae having slender pointed tails longer than those in other species, was collected from an elephant in the Bahr-el-Ghazal Province of the Sudan. R.T.L.

(47j) *Agriolimax laevis* and other British slugs can act as intermediate hosts for *Angiostrongylus cantonensis* which undergoes two moults in the slug. In the rat, its definitive host, the larvae pass by the blood stream to the cerebrum within 24 hours, moult twice, and at about the 12th day pass to the surface of the brain whence they force their way into the veins between the 28th and 31st day and, passing through the heart, finally reach their normal habitat in the pulmonary arteries. R.T.L.

(47k) During embryonation, which takes five days at 25°C., the ova of *Parascaris equorum* show a steady oxygen consumption. Thereafter it falls, except for a sharp rise on the eighth or ninth day when the first-stage larva is moulting. After this moult the oxygen consumption drops to one-third of the rate which obtained during embryonation. R.T.L.

47—Transactions of the Royal Society of Tropical Medicine and Hygiene (cont.)

- l. BELL, E. J., 1955.—“Experiments to determine the longevity of the larval stage of *Dictyocaulus viviparus* on pasture.” [Demonstration.] 49 (1), 12.
- m. MACDONALD, G., 1955.—“Medical implications of the Volta River Project.” 49 (1), 13–24. [Discussion pp. 24–27.]
- n. CRANE, P. S., BUSH, Jr., O. B. & CHUNG WON, P., 1955.—“Treatment of clonorchiasis with chloroquine and methiscol.” 49 (1), 68–70.
- o. MCCARTHY, D. D., MARPLES, M. J., BACON, D. F. & FITZGERALD, N., 1955.—“Researches in Western Samoa. I. General sanitation and intestinal parasites.” 49 (1), 71–75.
- p. MCCARTHY, D. D. & FITZGERALD, N., 1955.—“Researches in Western Samoa. III. Observations on filariasis.” 49 (1), 82–89.
- q. BUDDEN, F. H., 1955.—“Choroido-retinal lesions in onchocerciasis.” [Correspondence.] 49 (1), 91.

(47l) In the west of Scotland young calves were grazed during 1953–54 on fenced-off plots nine to eleven months after these had been heavily contaminated with faeces containing infective larvae of *Dictyocaulus viviparus*. At autopsy 50% of the calves were found to be infected with lungworms, indicating that the larvae had survived at least eleven months. Samples of heavily infected faeces were then placed on grass grown in small pots. Worm-free calves became infected when the faeces and grass were fed at intervals of three, six, nine and twelve months indicating that the larvae survive for at least nine months. R.T.L.

(47m) The proposed damming of the Volta river in the Gold Coast will result in the formation of the largest man-made artificial lake in the world. Attention is drawn to the risk of schistosomiasis being imported into the area by fishermen from endemic zones although so far none of the known vectors have been found in the area to be inundated. In the discussion which followed, Wilcocks suggested that the greatest danger would be from the slum conditions likely to arise subsequent to the industrial developments around the lake. R.T.L.

(47n) As treatment of clonorchiasis with emetine, various arsenicals and vermifuges proved a failure, chloroquine was tested with encouraging results. Twenty-two patients receiving 0.5 gm. thrice daily for two weeks obtained symptomatic relief and in 17 the number of eggs in the faeces showed a marked decrease. To those patients in which the stools became egg-free, Methiscol and other liver-building amino-acids had been given in addition to chloroquine. R.T.L.

(47o) With this description of the sanitary conditions in the village of Lauili in western Samoa, the incidence of helminthic and protozoal infections is tabulated. Examination of 210 faecal specimens gave *Ancylostoma* 15.7%, *Ascaris* 31.4%, *Trichuris* 31.9% and *Strongyloides* 2.9%. R.T.L.

(47p) There is a striking difference in the filarial incidence between the male and female population of the village of Lauili, on the north coast of Upolu in western Samoa and also in the population of Savaii, although in this island it is not as marked as in Upolu. 47.7% of all males of all ages showed clinical signs of infection while in the females the rate was only 26.5%. The filarial incidence has fallen appreciably during the past 30 years. It is probable that the gradual clearing of the bush from the village area for firewood etc. has led to the retreat of the vector *Aedes polynesiensis* and to the lower incidence of filariasis in women who spend most of their time in the village. Moreover, with the increase in the standard of living in recent years and the availability of cloth, the average Samoan woman's body and limbs are now covered to a greater extent than those of the men. R.T.L.

(47q) Referring to the explanatory note on his laboratory demonstration of the distribution of microfilariae of *Onchocerca volvulus* in the skin of man and its relation to the skin lesions and to blindness which appeared in *Trans. R. Soc. trop. Med. Hyg.*, 1954, 48, p. 7 [for abstract see *Helm. Abs.*, 23, No. 52j], Budden states that although, in the series of cases referred to therein, no connection could be established between choroido-retinal degeneration

47—Transactions of the Royal Society of Tropical Medicine and Hygiene (cont.)

- r. GORDON, R. M., 1955.—“Symposium on loiasis. I. A brief review of recent advances in our knowledge of loiasis and of some of the still outstanding problems.” 49 (2), 98–105.
- s. CREWE, W., 1955.—“Symposium on loiasis. II. The tabanid fauna of streams at Kumba, British Cameroons.” 49 (2), 106–110.
- t. OLDROYD, H., 1955.—“Symposium on loiasis. III. Some comments on the species of *Chrysops* bred and collected at Kumba, British Cameroons.” 49 (2), 111–114.
- u. DUKE, B. O. L., 1955.—“Symposium on loiasis. IV. The development of *Loa* in flies of the genus *Chrysops* and the probable significance of the different species in the transmission of loiasis.” 49 (2), 115–121.

in the posterior segment of the eye and the spread of microfilariae to the head region, he had examined a large number of persons in northern Nigeria from areas where onchocerciasis occurs and from areas where it is absent and showed that “posterior segment” changes are associated with onchocercal infection, although the immediate pathogenesis is obscure. R.T.L.

(47r) Gordon reviews published work on the transmission of *Loa loa* and its development in *Chrysops* and quotes several so far unpublished observations. Gordon & Crewe have observed *Chrysops* in the laboratory taking up surprisingly large amounts of glucose solution even when the gut was still distended with the last blood meal; Duke has found that *C. langi* will bite man exposed in the forest canopy between 5 p.m. and 9 p.m., and that infective forms of *L. loa* will develop in *C. silacea*, *C. centurionis* and *C. langi*; Hawking emphasizes the inadequacy of blood smears for diagnosis and suggests that improved methods for the production of adult and microfilarial antigens should be studied. Although at present no drug can be guaranteed to eradicate long-standing loiasis, administration of banocide to a population has been shown to cause a marked fall in the infection rate in the vectors. S.W.

(47s) Crewe has cultured tabanid larvae and pupae, collected from seven sites at Kumba where *Chrysops silacea* forms almost the entire tabanid population in the native town, European station and at ground level in the surrounding forest. The results were surprising in that *C. silacea* represented only 26% of the total flies emerging whereas *C. longicornis* and *C. langi* represented 30% and 29% respectively; there was also a very high proportion of male flies and a considerable number of rare or little known species. It is suggested that *C. longicornis* and *C. langi* maintain the reservoir of *Loa loa* in monkeys while *C. silacea* transmits from man to man and possibly also between man and monkeys. S.W.

(47t) Oldroyd discusses the species of *Chrysops* found at Kumba and is of the opinion that the subgenera *Kleineana* and *Chrysops* should be discarded. A number of species are physiologically capable of transmitting *Loa loa* but because of their behaviour do not normally do so. *Chrysops* is primarily a genus of savannah woodland but some species have migrated into the forest fringe or canopy. Nocturnal activity is far more widespread among tropical tabanids than has hitherto been supposed. S.W.

(47u) From his own research and from published work Duke concludes that all species of *Chrysops* are potential vectors of *Loa loa*. *C. silacea*, by reason of its prolonged and intimate contact with man is the most important vector; this species and *C. dimidiata* (less common except in certain areas) may have undergone mutual adaptations with the parasites. *C. zairai*, *C. distinctipennis* and *C. centurionis* are less effective vectors found on the fringes of endemic areas. Duke has found that microfilariae of *Loa* parasitic in *Mandrillus leucophaeus*, in one instance, showed a marked nocturnal periodicity which was maintained after passage through *C. silacea*. *L. loa* from man, transmitted to a young drill continued to show diurnal periodicity. S.W.

47—Transactions of the Royal Society of Tropical Medicine and Hygiene (cont.)

- v. BUCKLEY, J. J. C., 1955.—“Symposium on loiasis. V. The morphology of the larval stages in the vector: some of the problems involved.” 49 (2), 122-126.
- w. MANSON-BAHR, P., 1955.—“Symposium on loiasis. VI. Pacific filariasis.” 49 (2), 127-131.
- x. HAWKING, F., 1955.—“Symposium on loiasis. VII. Periodicity of microfilariae of *Loa loa*.” 49 (2), 132-142.
- y. KERSHAW, W. E., 1955.—“Symposium on loiasis. VIII. The epidemiology of infections with *Loa loa*.” 49 (2), 143-150.
- z. McROBERT, G. ET AL., 1955.—“Symposium on loiasis. Discussion.” 49 (2), 151-157.
- ba. HARKNESS, J., 1955.—“Dracontiasis in Tanganyika.” [Correspondence.] 49 (2), 197.
- bb. ALVES, W. & CLARKE, V. DE V., 1955.—“Prostate gland in *Biomphalaria alexandrina*.” [Correspondence.] 49 (2), 197.

(47v) Buckley compares the account of the development of *Loa loa* in *Chrysops* (given by Connal & Connal in 1922) with the descriptions of larval development in other filariae which have been given by others authors. He points out that although the Connals did not observe a second ecdysis, a further study of forms in experimentally infected *Chrysops* would probably establish the presence of the new skin, representing the second ecdysis, which was demonstrated by Manson in larvae of *Wuchereria bancrofti*. s.w.

(47w) Manson-Bahr discusses the problems of periodicity in the filariae. In the Pacific there are two clearly demarcated zones of periodicity: in New Caledonia the microfilariae do not show periodicity and are transmitted by day-biting *Aedes vigilax* and the infection does not appear to be pathogenic. He considers the biology of the vectors and the oecology of the disease in both zones and summarizes the results so far attained in attempts to eradicate or control the disease. s.w.

(47x) Reviewing the knowledge of periodicity in *Loa loa*, Hawking states “the microfilariae of *Loa* stay in the lungs during the night-time; they come out during the day hoping to meet a chrysops; and if they are disappointed in this, they return to the lung to rest and recuperate until the next day”. The mechanism by which the microfilariae hold themselves in the lung is still unknown. Exercise, altering the oxygen pressure, increasing the carbon dioxide, and hyperventilation had little or no effect on the number of microfilariae in the peripheral blood, whereas injections of insulin or the administration of a general anaesthetic caused a marked decrease. An irreversible lowering of microfilarial counts followed the administration of diethylcarbamazine. s.w.

(47y) *Loa loa* infection appears to be restricted to the tropical rain-forests of Central and West Africa. Summarizing published work on the epidemiology, Kershaw concludes that the parasite has possibly been longer established in monkeys than in man; the host-parasite-vector complex now appears to be in stable equilibrium at a high level of incidence and intensity in man living in villages in the intact rain-forests, in which certain monkeys live in the forest canopy. The complex is very sensitive to changes in its environment. He has shown that although the number of microfilariae taken in by an individual fly cannot be calculated from the size of the blood meal and microfilarial concentration in the host's blood, the frequency distribution curve of the numbers taken in by a group of flies resembles in its shape and is related in its parameters to that of the numbers expected to be taken in. Kershaw is of the opinion that it is not yet possible to build up a comprehensive mathematical model for this infection. s.w.

(47z) In the discussion McRobert and MacArthur propose the universal adoption of the term “loiasis” in preference to “loasis” or “loaiasis”, Bertram compares his observations on *Litomosoides carinii* with those recorded for *Loa loa*, Woodruff disagrees that diethylcarbamazine is ineffective and Macdonald proposes the substitution of a different expression (for the survival rate of *Chrysops*) for that proposed by Kershaw and his co-workers. s.w.

(47ba) Harkness comments on a letter by Laurie on dracontiasis in Tanganyika [for abstract see Helm. Abs., 23, No. 322k] and states that during eight years in the Lake Province he saw cases from time to time and did not consider them to be unusual. s.w.

8—Ugeskrift for Laeger.

- a. RAFAELSEN, O. J., 1955.—“Taeniasis behandlet med mepacrin.” 117 (2), 54-56. [English summary p. 56.]

(48a) The scolex was passed by 16 out of 20 taenia cases which had received 800 mg. of mepacrine in a little milk or water. The treatment was preceded and followed by laxatives and an enema. The other four cases passed strobila, including the smallest proglottides but without the scolex. In two of these no further proglottides have been discharged since they were treated.
G.I.P.

9—United States Armed Forces Medical Journal.

- a. RACHELSON, M. H. & FERGUSON, W. R., 1955.—“Prevalence of pinworm infestation at a military installation.” 6 (1), 60-66.

(49a) A survey by cellulose tape swabs of 505 children from six months to twelve years of age in the pediatric section of the U.S. Air Force Hospital, Westover Air Force Base, Mass., showed that 31.6% were infected with *Enterobius*.
R.T.L.

10—Veterinary Medicine.

- a. SHUMARD, R. F. & EVELETH, D. F., 1955.—“A preliminary report on the anthelmintic action of piperazine citrate on *Ascaridia galli* and *Heterakis gallinae* in hens.” 50 (5), 203-205.

(50a) In laboratory trials piperazine citrate (at the rate of 8,000 mg. per gal.) given in the drinking water for one, two, three or four days was completely effective against *Ascaridia galli* in fowls, but less so against *Heterakis gallinae*. A field trial using a concentration of 10,000 mg. per gal. for three days gave similar results. One fowl treated at the rate of 16,000 mg. per gal. appeared to be cleared of *H. gallinae* infection.
D.M.

11—Veterinary Record.

- a. LEE, R. P., 1955.—“The anthelmintic efficiency of piperazine adipate against *Neoascaris vitulorum* (Goeze, 1782). A preliminary report.” 67 (8), 146-149.
b. POYNTER, D., 1955.—“Piperazine adipate as an equine anthelmintic.” 67 (9), 159-163.
c. DAVIES, S. F. M. & JOYNER, L. P., 1955.—“Observations on the parasitology of deep litter in poultry houses.” 67 (11), 193-199.
d. ROBERTS, H. E., 1955.—“Leech infestation of the eye in geese.” 67 (11), 203-204.
e. TAYLOR, E. L., 1955.—“Parasitic helminths in mediaeval remains.” 67 (12), 216-218.
f. MICHEL, J. F. & PARFITT, J. W., 1955.—“A contribution to the epidemiology of parasitic bronchitis in calves.” 67 (13), 229-235.
g. MICHEL, J. F. & SHAND, A., 1955.—“A field study of the epidemiology and clinical manifestations of parasitic bronchitis in adult cattle.” 67 (14), 249-266.
h. WHITE, E. G., 1955.—“Lungworms in pigs: specimens invited.” [Correspondence.] 67 (15), 288.
i. JARRETT, W. F. H., JENNINGS, F. W., MCINTYRE, W. I. M., MULLIGAN, W. & URQUHART, G. M., 1955.—“Immunological studies on *Dictyocaulus viviparus* infection. Passive immunisation.” 67 (16), 291-296.
j. BYWATER, H. E., 1955.—“The toxicity of hexachloroethane.” [Correspondence.] 67 (20), 382.

(51a) Piperazine adipate was administered to calves at Vom, Nigeria, at rates varying from 0.1 gm. to 0.3 gm. per lb. body-weight. No toxic reactions were produced. When administered to calves infected with *Neoascaris vitulorum* at a rate of 0.1 gm. or 0.2 gm. per lb., the eggs disappeared from the faeces within five days of treatment. Critical tests confirmed the drug as being 100% effective against immature and mature *N. vitulorum* at a dosage rate of 0.1 gm. per lb. The drug does not affect the development of eggs from expelled worms but, if the treated animals are run on an open range for at least five days after drenching, the tropical sun will destroy the larvae before they reach their infective stage.
D.M.

(51b) Piperazine adipate was administered to 14 horses at the rate of 10 gm. per 100 lb. body-weight. No toxic reactions were produced. The drug proved a very efficient anthelmintic against *Parascaris equorum* and was partially so against *Strongylus vulgaris*. It had little or no action on *S. edentatus* and *Gastrophilus* spp. Diethylcarbamazine acid citrate was administered to six ponies at the rate of 2.5 gm. per 100 lb. body-weight. A marked reduction in the ascarid egg counts occurred but those of the strongyles were inconclusive. Comparison of the two compounds is difficult because of the different rates of administration. D.M.

(51c) Twelve deep litter units in poultry houses were visited at intervals between November 1952 and June 1953 and the number of parasites, moisture content, pH, titratable alkali and total ammonia in the litter sample from the twelve units were determined. A seasonal variation in the moisture content was observed. More ova of *Ascaridia galli*, *Heterakis gallinae* and *Capillaria* sp. were present when the moisture content was high, the most common causes of which were inefficient drinking appliances and the use of long straw. Temperatures in the litter are not high enough to eliminate the ova and may even favour their development. Similarly, free ammonia seems to be of minor importance in limiting their numbers. The ability of the litter to generate heat establishes a temperature gradient between the litter and the air and is an important factor in keeping the litter dry. The observations suggest that dryness is the only factor of importance in reducing the numbers of parasites in deep litter. D.M.

(51d) An outbreak, in north-west Shropshire, of severe kerato-conjunctivitis in a flock of 13 geese on free range was found to be due to the presence of numerous small leeches, *Theromyzon tessulatum*. Treatment consisted of the manual removal of the fibrino-caseous eye casts and instillation of antiseptic ointment. *T. tessulatum* is plentiful in the area but normally occurs in the nasal cavities of wild water-birds. D.M.

(51e) A report is made on material, possibly of animal origin, excavated from mediaeval remains in Winchester. The material was found 8 ft. below ground in a tank about 8 ft. by 10 ft. in diameter and consisted of a dark greenish grey layer of peaty consistency. A preliminary examination showed nematode eggs present which were later identified as *Trichuris trichiura* and *Ascaris lumbricoides*, of which 5,700 and 600 eggs occurred respectively per gramme of the material. Eggs of *Dicrocoelium dendriticum* were also present. The shells of the eggs were in good condition, especially those of *Trichuris*. The absence of any strongyloid eggs in probably due to the delicate nature of their shells which could not resist disintegration. Two possibilities are presented as to the origin of the material, the more obvious one being that it is from swine. The second is that it is of human origin and that the tank was some form of latrine where the faecal contents of years collected. This would explain the high egg count. The large size of the pit suggests a prison or mad house. A notable feature is the difference in the numerical relationship of *Ascaris* and *Trichuris* between new porcine material and this 1,000-year-old material. This is considered to be due, possibly, to the partial disintegration of the *Ascaris* eggs leaving the *Trichuris* eggs predominant. The unexpected occurrence of *D. dendriticum* is discussed. D.M.

(51f) The paper reports an investigation of the numbers of lungworm larvae on herbage and in faeces. Two infected calves were put out in a half-acre paddock, and other clean calves were put in and taken out of the paddock at intervals to observe the effect on them and the effect they had on the level of infestation of the pasture. The following results may be recorded as preliminary observations. There is a close correlation between the number of larvae per lb. of herbage and the clinical effect produced on a susceptible calf. The infestation of the herbage is subject to wide fluctuation, which can be very rapid. The concentration of the larvae on the herbage is affected to a greater extent by climatic and other factors than by the numbers passed in the faeces. An animal passing only small numbers of larvae is potentially capable of producing lethal herbage infestation. The range between a harmless and a lethal herbage infestation is very narrow. The concentration of larvae in the herbage falls away quickly in spring and early summer, whereas the larvae may persist for four months in autumn and early winter but may completely disappear during the winter. D.M.

(51g) The investigation reported by Michel & Shand was to determine if there were any common factors in outbreaks of husk in adult cattle. The histories of 17 outbreaks, selected for their diversity, are described and discussed. A number of points emerge, although no single simple factor appears to be common to all cases. Husk symptoms vary with the severity of the disease from a mild cough to a syndrome (described) identical with that seen in fog fever. Symptoms occur 12 days or more after exposure to a heavy infection, 12 days or less after a move to aftermath, or without any obvious precipitating cause. Their onset is generally sudden and almost simultaneous in all affected animals. In most of the outbreaks the infection was endemic on the farm, although at a subclinical level. It would seem that the ultimate source of infection is in the form of larvae passed by carrier animals and not larvae that survived on the ground through the winter. The indications were that larvae could not even exist five months on the ground. Although only small numbers of larvae may be spread by the carrier animals, they can raise the infestation of the ground to a dangerous level in two ways, i.e. by the intervention of calves who become lightly infected but pass an increased number of larvae on to the pasture and by the larvae themselves encountering particularly favourable conditions. Lush, leafy leys appear to represent a favourable vehicle for the survival and transmission of infection. The level of infestation on the ground may remain dangerous even though an intervening hay cut has been taken. There is no evidence of any factor rendering adult cattle particularly susceptible. The plane of nutrition does not appear to play any part. A sudden exposure to infection is more dangerous than a gradual one and an animal that has been protected from infection for some time appears to be particularly susceptible when it comes in contact with the disease. Control of husk should be by good husbandry practices, but as yet no confident recommendation on this can be made. The aim should be to keep the cattle constantly exposed to a low level of infection and to avoid sudden exposure to massive infections.

D.M.

(51h) In view of the recent evidence that one-fifth of the bacon pigs in England and Wales harbour lungworms, White (of the Department of Veterinary Preventive Medicine, University of Liverpool) asks veterinary practitioners for lungs and faecal samples from pigs, and earthworms from infected premises in order to obtain more information on all aspects of the infection. Instructions for packing etc. are given.

S.W.

(51i) Jarett *et al.*, working with an immune globulin preparation derived from hyper-immune serum, have successfully immunized five 10-week-old calves against *Dictyocaulus viviparus* infection. A difference between the immunized and control calves, both infected with 4,000 *D. viviparus* larvae, became apparent on the 17th day after infection when the respiratory rate of the controls was considerably higher than that of the immunized calves. On the 25th and 29th days after infection faecal larval counts showed 50-500 and 100-900 larvae per gramme respectively in the control calves and none or very few in the immunized group. The average numbers of lungworms collected post mortem were 786 in the controls and 37.4 in the immunized calves. Complement fixation tests revealed the presence of circulating antibodies in both groups although the level in the control groups never increased to the equivalent of the minimum level reached in the immunized groups. There was no evidence that a cellular response enhancing the pneumonic effect took place in the lungs of immunized animals.

S.W.

(51j) Although hexachlorethane is extensively used in the treatment of fascioliasis in cattle and is generally well tolerated, Bywater reports that several instances of poisoning have occurred in cattle receiving less than half the normal therapeutic dose in the border counties of Wales, the North of England and Northern Ireland. All the cases occurred in animals on a low nutritional plane. The death rate in adult cattle is estimated as around 12 per 1,000. The post-mortem examinations made revealed a low or normal fluke infestation without severe liver damage.

R.T.L.

52—Veteriner Fakültesi Yayınları. Ankara Üniversitesi.

- a. GÜRALP, N., 1955.—“Koyunlarımızda görülen Trichostrongylidae türlerine dair sistematik araştırmalar.” 64, Çalışmalar 33, 118 pp. [English summary pp. 110–111.]

(52a) The trichostrongylids collected from the gastro-intestinal tract of 10 Anatolian sheep belonged to 14 species and numbered 10,697 specimens. The most frequent were *Trichostrongylus probolurus* (34.78%), *Ostertagia* (*O.*) *circumcincta* (25.87%), *O.* (*Marshallagia*) *marshalli* (13.20%) and *Haemonchus contortus* (10.99%). *Nematodirus abnormis* is now reported for the first time from Turkey. *Camelostrongylus mentulatus* was also found in sheep. Most of the *H. contortus* collected had a linguiform vulvar flap. G.I.P.

53—West African Medical Journal.

- a. McCULLOUGH, F. S., 1955.—“Observations on *Schistosoma haematobium* infection and on the vector snails at Tema in the Gold Coast.” 4 (1), 18–24.
 b. TUBOKU-METZGER, A. F., 1955.—“Case of *Ascaris lumbricoides* infestation associated with priapism.” 4 (1), 42.
 c. RODHAIN, J., 1955.—“Les localisations tissulaires de *Microfilaria volvulus*. Remarque au sujet de la note de M. H. Hughes: ‘Some observations on the pathology of onchocerciasis’.” [Correspondence.] 4 (1), 44. [Also in English p. 45.]
 d. HUGHES, M. H., 1955.—“Identification of microfilariae in tissue sections.” [Correspondence.] 4 (1), 45–46.

(53a) In the Tema area on the low-lying plains east of Accra the incidence of *Schistosoma haematobium* is low, only 25 out of 400 children being found infected. The local form of *Bulinus* (*Pyrgophysa*) *forskali* was refractory to experimental infection and of the hundreds of specimens collected none was naturally infected. Apparently *Physopsis africana* is the only vector in the area. A much used pond in the bed of the Gbagbakonu stream at Ashaiman village four miles north of Tema contained *P. africana* and six out of 14 children were found to be infected there. R.T.L.

(53c) Rodhain, replying to observations made on onchocerciasis by Hughes [for abstract see Helm Abs., 23, No. 523c] confirms his own observations that microfilariae of *Onchocerca volvulus* can become localized in deep tissue. S.W.

(53d) Hughes replies to Rodhain [see No. 53c above] and is of the opinion that the question of deep tissue localization of microfilariae of *Onchocerca volvulus* requires reinvestigation. S.W.

NON-PERIODICAL LITERATURE

- 54—UNITED STATES DEPARTMENT OF AGRICULTURE, 1955.—“Index-catalogue of medical and veterinary zoology. Supplement 3. Authors: A to I.” Washington, D.C.: U.S. Government Printing Office, pp. 459–844.